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ANNUAL REPORT OF THE  
GOVERNOR OF THE  
PANAMA CANAL, 1936

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ANNUAL REPORT  
OF THE  
GOVERNOR OF  
THE PANAMA CANAL  
FOR THE  
FISCAL YEAR  
ENDED JUNE 30  
1936



UNITED STATES  
GOVERNMENT PRINTING OFFICE  
WASHINGTON : 1936

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THE CANADIAN ANNUAL REPORT OF GOVERNMENT

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## REPORTS OF HEADS OF DEPARTMENTS AND DIVISIONS

### APPENDIXES NOT PRINTED

The material in the annual report of the Governor of the Panama Canal, published in this volume, is to a large extent a summary of the data presented in the annual reports from the heads of departments and divisions in the Canal organization; the latter, regarded as appendixes to the report of the Governor, are not printed. The annual reports of the Panama Railroad Company and the health department are published separately; the latter is compiled for calendar years only. The reports of the heads of departments and divisions, as listed below, are on file at the Washington office of the Panama Canal or at the office of the Governor at Balboa Heights, Canal Zone:

Engineer of maintenance, report of

Dredging division, report of superintendent

Plans section, report of chief

Assistant engineer of maintenance, report of

Designing engineer, report of

Electrical division, report of electrical engineer

Municipal engineering division, report of municipal engineer

Locks division, report of superintendent

Office engineer, report of

Section of surveys, report of chief

Marine division, report of marine superintendent

Mechanical division, report of superintendent

Supply department, report of chief quartermaster

Accounting department, report of comptroller

Executive department:

Division of civil affairs, report of chief

Police and fire division, report of chief

Division of schools, report of superintendent

Bureau of clubs and playgrounds, report of general secretary

Division of personnel administration, report of chief personnel officer

Surveying officer, report of

Public defender

Paymaster

Magistrates' courts:

Magistrate, Cristobal, report of

Magistrate, Balboa, report of

Land agent, the Panama Canal and Panama Railroad Co., report of

Washington office, report of general purchasing officer and chief of office

Pardon Board, report of chairman

Aeronautical inspector, report of



ANNUAL REPORT  
OF THE  
GOVERNOR OF THE PANAMA CANAL

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BALBOA HEIGHTS, CANAL ZONE,  
*September 15, 1936.*

The SECRETARY OF WAR,  
*Washington, D. C.*

SIR: I have the honor to submit the report of the Governor of the Panama Canal for the fiscal year ended June 30, 1936.

Particular attention is again invited to the discussion of the need for legislation to remove the existing inequalities in the rates of tolls charged ships using the Panama Canal and to prevent shipowners from causing further reductions in toll charges by making structural alterations in vessels that reduce their net tonnage ratings but that have practically no effect on their cargo-carrying capacity. This subject is covered in section III of the report under the heading of "Administrative problems." Ships now pay widely divergent amounts per unit of actual earning capacity because under the dual measurement system now in use the tolls are limited by a measurement of net tonnage which is not related closely to their earning capacity. The divergence between actual earning capacity and the limiting factor which governs the maximum collection of tolls grows greater year by year, and correspondingly the revenues of the Government are being unwarrantably and unnecessarily depleted through our inability, under the present law, to collect tolls on an equitable and uniform basis.

There is also a need, which grows more pressing year by year, for legislation which will enable the Canal administration to make small cash payments ranging from \$10 to \$25 per month to superannuated native workers who have faithfully served the Canal over a considerable number of years. Each year increasing numbers of these workers are becoming unfit for further active service, and while efforts are made to transfer them to light duties or to provide institutional care at the Corozal Farm, it would be more economical to grant them a small monthly annuity and permit them to live in their native environment and to be cared for by members of their

own race. The necessity for this legislation is discussed at greater length in section III of the report.

The need for the legislation outlined above is urgent, and its enactment is earnestly recommended.

Details of the more important features pertaining to Canal operation and maintenance are given in the accompanying report.

The undersigned succeeded Col. Julian L. Schley as Governor on August 27, 1936. At that time the preparation of this report had not been completed.

Respectfully,

C. S. RIDLEY, *Governor.*

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## INTRODUCTION

The administration of the affairs of the Panama Canal enterprise involves three main elements—(a) The operation and maintenance of the Canal itself, which primarily involves the maintenance of the waterway, the operation of the locks, and the control of traffic through the Canal; (b) the operation of the auxiliary enterprises necessary to provide adequately for the needs of shipping and of the Canal operating forces, such as coal and fuel-oil plants, storehouses for foodstuffs, ship chandlery, and other essential supplies, marine and railway repair shops, terminal facilities for the transshipment of cargo and passengers, a railroad line across the Isthmus and a steamship line between New York and Panama, quarters for the operating force, and other adjuncts essential to the economical and efficient operation of the Canal; and (c) the government of the Canal Zone, populated by American civilians, native or tropical workers and their families, and by the United States Army and Navy defense forces, in which are embraced education, sanitation, hospital service, police and fire protection, customs service, quarantine and immigration services, postal service, etc.

The immediate supervision of the administration of these various activities rests with the heads of the nine major departments and divisions reporting to the Governor, in whom is centered responsibility and control of the entire organization either in his capacity as Governor of the Panama Canal or as president of the Panama Railroad Co., an adjunct of the Canal enterprise, organized as a Government-owned corporation.

## OPERATION AND MAINTENANCE OF THE CANAL

The primary function of the Panama Canal is to provide and maintain a waterway by means of which vessels may make the transit

from one ocean to the other, and to handle such traffic as presents itself for transit with a maximum of safety and a minimum of delay. Throughout the year the Canal force maintained its high standard of expeditious service not only in the actual transiting of ships but in providing emergency repairs, fuel, supplies, and the various supplementary services incidental to shipping.

There were no interruptions to traffic during the year.

#### BUSINESS OPERATIONS

Secondary only to the operation of the Canal is the function of supplying various services to shipping. Commerce requires at the Canal certain adjuncts essential to shipping, such as those listed under (b) in the introductory paragraph. These services, under coordinated and centralized control, are provided by the various business units of the Panama Canal and Panama Railroad Co. The coordination of such services with the transit of ships through the Canal assists materially in the efficient and economical operation of the waterway. Moreover, in providing marine repair facilities, fuel, and other supplies, the operation of these business units promotes traffic through the Canal.

#### ADMINISTRATION—GOVERNMENT

The usual functions of government, such as schools, police and fire protection, quarantine, public health, immigration service, posts, customs, aids to navigation, steamboat inspection, hydrographic and meteorological work, water supply, sewers, construction and maintenance of streets, and similar activities which, in the United States, are directed by various officers of the national, State, and municipal governments, are entrusted in the Canal Zone to the Governor, and are executed under his authority and responsibility. This centralization of all governmental activities under one head is essential to economical and efficient administration.

#### SERVICES RENDERED BY THE CANAL TO SHIPPING

The most important items of the business of the Canal and its adjuncts covering principal services to shipping are expressed numerically in the following table, which presents a comparison of the activities during the fiscal year 1936 with the 2 years immediately preceding:

	Fiscal year, 1934	Fiscal year, 1935	Fiscal year, 1936
Transits of Canal by ocean-going ships paying tolls.....	5, 234	5, 180	5, 382
Free transits of ocean vessels.....	503	552	450
Total transits of ocean vessels.....	5, 737	5, 732	5, 832
Transits of local commercial traffic, not counted in ocean-going traffic.....	474	634	621
Number of lockages during year:			
Gatun Locks.....	5, 365	5, 316	5, 334
Pedro Miguel Locks.....	5, 507	5, 490	5, 548
Miraflores Locks.....	5, 483	5, 481	5, 538
Tolls levied on ocean vessels.....	\$24, 047, 183. 44	\$23, 307, 062. 93	\$23, 479, 114. 21
Tolls on local commercial vessels (not included in above).....	\$18, 519. 58	\$32, 175. 12	\$31, 512. 65
Total tolls.....	\$24, 065, 703. 02	\$23, 339, 238. 05	\$23, 510, 626. 86
Cargo passing through Canal (tons).....	24, 704, 009	25, 309, 527	26, 505, 943
Net tonnage (Panama Canal measurement) of transiting vessels.....	28, 550, 953	27, 805, 588	28, 024, 417
Cargo per Panama Canal net ton of ocean vessels, including those in ballast.....	0. 8653	0. 9102	0. 9458
Average tolls per ton of cargo, including tolls on vessels in ballast.....	\$0. 9734	\$0. 9209	\$0. 8858
Average tolls per Panama Canal net ton of vessel measurement, including vessels in ballast.....	\$0. 8423	\$0. 8382	\$0. 8378
Calls at Canal ports by ships not transiting Canal.....	989	925	1, 008
Cargo handled and transferred at ports (tons).....	1, 157, 649	1, 289, 898	1, 373, 179
Coal, sales and issues (tons).....	52, 657	43, 696	41, 813
Coal, number of commercial ships bunkered.....	196	198	215
Fuel oil pumped (barrels).....	9, 710, 247	9, 713, 542	10, 068, 543
Fuel oil—number of ships served other than vessels operated by the Panama Canal.....	1, 724	1, 703	1, 674
Ships repaired, other than Panama Canal equipment.....	513	522	594
Ships drydocked, other than Panama Canal equipment.....	49	97	119
Provisions sold to commercial ships (commissary sales).....	\$330, 570. 82	\$355, 954. 92	\$304, 547. 29
Chandlery sold to ships (storehouse sales).....	\$28, 165. 99	\$48, 730. 33	\$46, 183. 90

## REVENUES AND EXPENSES

The net revenues from Canal operations proper were \$14,531,654.54, as compared with \$14,519,506.01 last year. Net revenues from business operations under the Panama Canal for 1936 were \$920,185.23, as compared with \$1,021,216.61 in 1935. The combined net revenues accruing from the Canal and its business units totaled \$15,451,839.77, as compared with \$15,540,722.62 in 1935. The capital investment at the beginning of the fiscal year was \$546,636,490.05, and the net revenue represented a return of 2.83 percent on this investment, as compared with 2.86 percent the preceding year.

The foregoing figures do not include the operations carried on by the Panama Railroad Co., which yielded a net profit of \$1,077,987.07 for the year, as compared with \$927,642.87 for the previous fiscal year, an increase of \$150,344.20, or 16.2 percent.

## EARNINGS AND REPLACEMENTS

With respect to the operations of the Panama Canal, it will be noted that the net revenues from the Canal operation were slightly higher than in 1935, while for business operation they were somewhat lower. In this connection it may be stated that the profits in the business operations for 1935 were enhanced some \$145,000 due to

Economy Act pay-roll deduction, whereas the act was not effective in 1936. Eliminating the Economy Act savings, business operations for 1936 would have shown a greater profit than in 1935. Except for 1934, the net earnings have fallen short each year since 1930 of returning 3 percent on the capital investment, which is regarded as the minimum of fair return. An abnormal condition existed in 1934, however, in that notwithstanding a substantial increase in tolls for that year in comparison with 1933, there was an actual decrease in operating costs due to Economy Acts and the curtailment of various expenses.

The past fiscal year marked the close of 22 years of successful operation of the Panama Canal; in fact, its dependable and efficient service in shortening the routes of the world's commerce is now taken for granted.

One of the elements which has made this possible is the high state of maintenance in which all wearing and deteriorating parts are kept. It is estimated that of the total capital value of the Panama Canal there are approximately \$150,000,000 of general structural values subject to deterioration and requiring regular repair and periodical replacement, but without reserve funds from operating revenues by which to defray the costs thereof. These have been in service for 22 years.

Some of these structures, such as dams, breakwaters, and concrete buildings, are still in excellent condition and require but little expenditure for upkeep; but on others deterioration has reached a point where replacement should not longer be deferred. These necessary replacements include not only the frame buildings originally erected to serve during the period of the construction of the Canal but also docks, highways, etc., which, due to ordinary deterioration and to earth slides and other unforeseen conditions, have been rendered inadequate or unserviceable for present requirements or uneconomical to maintain.

There seems to be a general misunderstanding that because the earnings of some of the activities of the Canal are authorized for reexpenditures by the Governor, all necessary replacements can be financed from this source. This is far from true as such earnings are comparatively small in amount and may be reexpended only upon the plant facilities from which the earnings were derived. The general structures referred to are those which are not directly self-supporting, but which, nonetheless, are essential to the primary function of the Canal in the earning of tolls, which revenue must be covered directly into the Treasury. Thus replacement funds are not available for this most essential property, save by direct appropriation by the Congress.

Not only is there demand for extending and enlarging some of the structures but also the need develops for new kinds of facilities. Funds for such structures must also be obtained by direct appropriation.

For these reasons, it is essential to the continued efficiency of the Canal and to the growth of its facilities to meet the growing demands that the Bureau of the Budget and the Congress give careful consideration to the requirements submitted annually by the Governor for these purposes.



SECTION I

CANAL OPERATION AND TRADE VIA PANAMA CANAL

TRAFFIC IN 1936

The number of ocean-going commercial <sup>1</sup> vessels making transit of the Panama Canal in 1936 aggregated 5,382, in comparison with 5,180 in 1935, a gain of 202, or 3.9 percent. This represents a daily average of 14.70, as compared with 14.19 in 1935, 14.34 in 1934, 11.40 in 1933, and 11.92 in 1932. The highest traffic in any fiscal year since the Canal has been open to traffic was in 1929 when 6,289 vessels passed through, a daily average of 17.23.

Tolls on the 5,382 transits in 1936 totaled \$23,479,114.21, in comparison with \$23,307,062.93 in 1935, an increase of \$172,051.28, or 0.7 of one percent.

The net tonnage, Panama Canal measurement, of the ocean-going commercial traffic going through the Canal in 1936, totaled 28,024,417 in comparison with 27,805,588 in 1935, a gain of 218,829, or 0.8 of one percent. Cargo tonnage in 1936 aggregated 26,505,943, in comparison with 25,309,527 in 1935, an increase of 1,196,416, or 4.7 percent.

The larger percentage gain in transits in comparison with tonnage and tolls is due to a reduction in the average size ship using the Canal. The average Panama Canal net of the vessels using the Canal in 1936 was 5,221 in comparison with 5,390 in 1935.

The history of Canal traffic has reflected five distinct trends in the world's economic and commercial developments. After the opening of the Canal on August 15, 1914, there was a slow growth through 8 years, in which the maximum transits were 2,791 in 1921. The rise in California oil production was primarily responsible for increasing the transits to 3,908 in 1923 and 5,158 in 1924. Traffic continued at about this level until the business expansion brought a considerable increased volume toward the end of the last decade when Canal traffic reached peaks of 6,289 transits, \$27,111,125.47 in tolls, 30,647,768 in cargo tonnage, and 29,963,670 in net tonnage, Panama Canal measurement. From these peaks the world-wide depression resulted in a sharp curtailment of traffic, the actual low point being

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<sup>1</sup> Includes all tolls-paying vessels having a measurement of 300 or more net tons or 500 or more displacement tons.

reached in 1933 when transits dropped to 4,162, tolls to \$19,601,077.17, cargo tonnage to 18,161,165, and net tonnage, Panama Canal measurement, to 22,803,798. However, a gradual increase in Canal traffic began in August 1932, coincident with the general improvement in economic conditions, with the result that traffic for 1933 fell but little short of equalling that of the previous year. In 1934 there was a rise of over 1,000 transits, but the 1935 traffic was slightly less than in 1934 due to a considerable drop in tanker traffic, which more than offset the continued gradual rises among general cargo ships.

The number of transits and the cargo tonnage passing through the Canal in 1936 was the highest since 1930. Net tonnage (Panama Canal measurement) and tolls collection, however, were less than for the 5,234 transits in 1934. This is attributed in the main to a further curtailment in the transit of tankers which, on the whole, are of greater tonnage and pay more tolls than the average ship of the general cargo type. Traffic of tank ships in 1936 was the lowest of any fiscal year since the beginning of the heavy movement of mineral oils from the California fields in 1923. (Details of tanker traffic are covered on pp. 10 and 11 of this report.)

Of the gain in cargo tonnage in 1936, the increase from the Atlantic to the Pacific was 9.6 percent and in the opposite direction, 2.6 percent. A general increase was noted throughout the list of leading commodities shipped west-bound, prominent among which were such items as manufactures of iron and steel, mineral oils, paper and paper products, tinplate, sulphur, automobiles, machinery, etc. In the other direction a number of important increases were noted—lumber, ores, sugar, canned goods, and fresh fruit making important gains—but the total increase was held to a comparatively insignificant figure due to a loss of over a million tons of mineral oils. (A summary of the commodity movement is presented on pp. 20 and 21 of this report.)

The west-bound movement of cargo in all of the principal trade routes, with the exception of that from the United States to the Orient, made substantial gains in comparison with 1935, the movement between the United States and the Orient being adversely affected by smaller shipments of scrap metal. In the opposite direction the United States intercoastal trade decreased 660,202 tons, or 11.4 percent, due principally to a sharp reduction in mineral oil shipments; and that between South America and Europe declined 310,826 tons, or 11.8 percent, due chiefly to lighter shipments of mineral oils and nitrates. The east-bound traffic over all the other principal trades either equals or shows gains in comparison with 1935.

(Movement of cargo over principal trade routes will be found on pp. 14 to 19 of this report.)

In the fiscal year 1936 the transits of naval and other public vessels of the United States Government, war vessels of the Colombian Government, vessels transiting solely for repairs, and training ships, none of which paid tolls, numbered 450, as against 552 for 1935. The total of tolls-paying and free transits combined, which includes all ocean-going vessels of 300 tons or more, numbered 5,832, in comparison with 5,732 in 1935, making daily averages of 15.93 and 15.70, respectively.

The receipts from tolls reported by the accounting department for the fiscal year 1936 were \$23,506,806.46. This figure includes tolls on local commercial traffic, which are not included in the Canal statistics covering ocean-going commercial traffic. The accounting department figures on tolls also have been adjusted in accordance with refunds for overcharges and supplemental collections in the event of undercharges. These items account for the difference of \$27,692.25 between the accounting figures and the figure for tolls levied on ocean-going commercial traffic as reported in the following studies of traffic, which are based on tolls levied at the time of transit.

Comparative traffic statistics covering ocean-going vessels for each fiscal year since the Canal was opened to navigation are shown in the table below:

Fiscal year ended June 30—	Number of transits	Panama Canal net tonnage	Tolls	Tons of cargo
1915 <sup>1</sup> .....	1,058	3,791,770	\$4,366,747.13	4,888,400
1916 <sup>2</sup> .....	724	2,391,433	2,403,089.40	3,093,335
1917.....	1,738	5,791,236	5,620,799.83	7,054,720
1918.....	1,989	6,563,864	6,428,780.26	7,525,768
1919.....	1,948	6,116,877	6,164,260.79	6,910,097
1920.....	2,393	8,538,804	8,507,938.68	9,372,374
1921.....	2,791	11,405,550	11,268,681.46	11,595,971
1922.....	2,665	11,411,482	11,191,828.56	10,882,607
1923.....	3,908	18,601,298	17,504,027.19	19,566,429
1924.....	5,158	26,142,021	24,284,659.92	26,993,167
1925.....	4,592	22,847,527	21,393,718.01	23,956,549
1926.....	5,087	24,763,075	22,919,931.89	26,030,016
1927.....	5,293	26,210,623	24,212,250.61	27,733,555
1928.....	6,253	29,436,697	26,922,200.75	29,615,651
1929.....	6,289	29,822,122	27,111,125.47	30,647,768
1930.....	6,027	29,963,670	27,059,998.94	30,018,429
1931.....	5,370	27,773,037	24,624,599.76	25,065,283
1932.....	4,362	23,613,370	20,694,704.61	19,798,986
1933.....	4,162	22,803,798	19,601,077.17	18,161,165
1934.....	5,234	28,550,953	24,047,183.44	24,704,009
1935.....	5,180	27,805,588	23,307,062.93	25,309,527
1936.....	5,382	28,024,417	23,479,114.21	26,505,943
Total.....	87,603	422,369,212	383,113,811.01	415,429,749

<sup>1</sup> Canal opened to traffic Aug. 15, 1914.

<sup>2</sup> Canal closed to traffic approximately 7 months of fiscal year by slides.

## TRAFFIC BY MONTHS

The commercial traffic during each month of the fiscal year 1936 is summarized in the following table, in which are inserted for comparison the figures for the preceding year:

Month	Number of vessels		Panama Canal net tonnage		Tons of cargo		Tolls	
	1934-35	1935-36	1934-35	1935-36	1934-35	1935-36	1934-35	1935-36
July.....	394	377	2, 177, 193	2, 035, 873	1, 934, 237	1, 777, 815	\$1, 822, 909.64	\$1, 683, 649.94
August.....	401	395	2, 245, 247	2, 102, 387	2, 187, 780	2, 019, 298	1, 906, 821.39	1, 757, 259.77
September.....	435	391	2, 332, 351	2, 095, 599	2, 142, 832	1, 994, 487	1, 947, 536.76	1, 780, 805.80
October.....	467	441	2, 516, 087	2, 357, 640	2, 172, 752	2, 228, 536	2, 098, 299.03	1, 964, 076.81
November.....	469	418	2, 546, 417	2, 165, 559	2, 339, 001	2, 050, 422	2, 137, 916.55	1, 796, 820.57
December.....	443	459	2, 331, 250	2, 382, 602	2, 089, 310	2, 187, 731	1, 952, 192.57	1, 997, 206.74
January.....	425	472	2, 294, 137	2, 411, 073	1, 945, 085	2, 148, 935	1, 911, 094.13	2, 018, 543.52
February.....	430	452	2, 205, 057	2, 322, 013	1, 836, 383	2, 155, 031	1, 826, 999.63	1, 952, 682.73
March.....	455	526	2, 398, 231	2, 714, 768	2, 210, 434	2, 634, 150	2, 018, 114.62	2, 293, 874.51
April.....	432	482	2, 258, 926	2, 483, 561	2, 079, 028	2, 430, 134	1, 890, 572.41	2, 079, 730.70
May.....	424	488	2, 366, 455	2, 504, 215	2, 291, 968	2, 419, 652	1, 996, 156.81	2, 081, 103.73
June.....	405	481	2, 134, 237	2, 449, 127	2, 080, 717	2, 459, 752	1, 798, 449.39	2, 073, 359.39
Total.....	5, 180	5, 382	27, 805, 588	28, 024, 417	25, 309, 527	26, 505, 943	23, 307, 062.93	23, 479, 114.21
Average per month.....	432	449	2, 317, 132	2, 335, 368	2, 109, 127	2, 208, 829	1, 942, 255.24	1, 956, 592.85

## TANKER TRAFFIC

Transits of tank ships during the fiscal year 1936 totaled 598, a decrease of 193, or 24.4 percent, in comparison with the 1935 total of 791. Tanker transits in 1936 comprised 11.1 percent of the total ocean-going commercial transits, made up 12.4 percent of the total net tonnage (Panama Canal measurement), paid 13.6 percent of the total tolls collected, and carried 14.9 percent of the cargo which passed through the Canal.

Cargo carried through the Canal in tank ships during the fiscal year 1936 amounted to 3,953,795 tons, in comparison with 4,914,902 tons in 1935, a decrease of 961,107 tons, or 19.6 percent. Segregation of the 1936 traffic by direction of transits shows that 496,770 tons of tanker cargo went through from the Atlantic to the Pacific, and 3,457,025 tons from the Pacific to the Atlantic.

Of the mineral oil cargoes carried through the Canal during the fiscal year 1936, approximately 40 percent was gasoline, benzene, and naphtha; 38 percent crude oil; 15 percent gas and fuel oils; and the remainder, 7 percent, lubricating oils and kerosene.

The three tables below, which begin with the fiscal year 1923 and thus cover the period during which tankers have been an important component of the traffic through the Canal, show the traffic divided between tank ships and all other ocean-going commercial or tolls-paying vessels, classified herein as general. The tables show the number and daily averages of the two classes, and of the total; the quantities and proportion of net tonnages, and the amounts and proportions of tolls:

*Number and daily average transits of tankers and general carriers*

Fiscal year	Ocean-going commercial transits			Daily average		Total
	Tankers	General	Total	Tankers	General	
1923.....	913	2,995	3,908	2.5	8.2	10.7
1924.....	1,704	3,454	5,158	4.7	9.4	14.1
1925.....	1,079	3,513	4,592	3.0	9.6	12.6
1926.....	1,090	3,997	5,087	3.0	11.0	14.0
1927.....	1,324	3,969	5,293	3.6	10.9	14.5
1928.....	1,121	5,132	6,253	3.0	14.0	17.0
1929.....	1,083	5,206	6,289	3.0	14.2	17.2
1930.....	1,218	4,809	6,027	3.3	13.2	16.5
1931.....	944	4,426	5,370	2.6	12.1	14.7
1932.....	612	3,750	4,362	1.7	10.2	11.9
1933.....	636	3,526	4,162	1.7	9.7	11.4
1934.....	942	4,292	5,234	2.6	11.7	14.3
1935.....	791	4,389	5,180	2.2	12.0	14.2
1936:						
July.....	47	330	377	1.5	10.7	12.2
August.....	57	338	395	1.8	10.9	12.7
September.....	50	341	391	1.7	11.3	13.0
October.....	52	389	441	1.7	12.5	14.2
November.....	37	381	418	1.2	12.7	13.9
December.....	53	406	459	1.7	13.1	14.8
January.....	40	432	472	1.3	13.9	15.2
February.....	39	413	452	1.3	14.3	15.6
March.....	54	472	526	1.7	15.3	17.0
April.....	55	427	482	1.8	14.3	16.1
May.....	55	433	488	1.8	13.9	15.7
June.....	59	422	481	2.0	14.0	16.0
Total.....	598	4,784	5,382	1.6	13.1	14.7

*Proportions of tanker and general net tonnage*

	Panama Canal net tonnage			Percentage of total net tonnage		
	Tankers	General	Total	Tankers	General	Total
1923.....	5,374,384	13,226,914	18,601,298	28.9	71.1	100.0
1924.....	10,212,047	15,929,974	26,142,021	39.1	60.9	100.0
1925.....	6,424,622	16,422,905	22,847,527	28.1	71.9	100.0
1926.....	6,343,240	18,419,835	24,763,075	25.6	74.4	100.0
1927.....	7,624,112	18,586,511	26,210,623	29.1	70.9	100.0
1928.....	6,243,969	23,192,728	29,436,697	21.2	78.8	100.0
1929.....	5,844,263	23,977,859	29,822,122	19.6	80.4	100.0
1930.....	6,564,138	23,399,532	29,963,670	21.9	78.1	100.0
1931.....	5,284,873	22,488,164	27,773,037	19.0	81.0	100.0
1932.....	3,570,398	20,042,972	23,613,370	15.1	84.9	100.0
1933.....	3,808,784	18,995,014	22,803,798	16.7	83.3	100.0
1934.....	5,811,995	22,738,958	28,550,953	20.4	79.6	100.0
1935.....	4,676,761	23,128,827	27,805,588	16.8	83.2	100.0
1936.....	3,487,498	24,536,919	28,024,417	12.4	87.6	100.0

*Proportion of tolls from tank ships and from all other vessels*

	Tolls paid by shipping using canal			Percentage of total tolls		
	Tankers	General	Total	Tankers	General	Total
1923.....	\$4,769,324.63	\$12,734,702.56	\$17,504,027.19	27.2	72.8	100.0
1924.....	9,071,835.65	15,212,824.27	24,284,659.92	37.4	62.6	100.0
1925.....	5,728,302.26	15,665,415.75	21,393,718.01	26.8	73.2	100.0
1926.....	5,626,167.93	17,293,763.96	22,919,931.89	24.5	75.5	100.0
1927.....	6,658,806.90	17,553,443.71	24,212,250.61	27.5	72.5	100.0
1928.....	5,436,437.16	21,485,763.59	26,922,200.75	20.2	79.8	100.0
1929.....	5,145,632.19	21,965,493.28	27,111,125.47	19.0	81.0	100.0
1930.....	5,768,963.28	21,291,035.66	27,059,998.94	21.3	78.7	100.0
1931.....	4,682,320.14	19,942,279.62	24,624,599.76	19.0	81.0	100.0
1932.....	3,197,136.29	17,497,568.32	20,694,704.61	15.4	84.6	100.0
1933.....	3,393,311.02	16,207,766.15	19,601,077.17	17.3	82.7	100.0
1934.....	5,161,787.40	18,885,396.04	24,047,183.44	21.5	78.5	100.0
1935.....	4,192,863.09	19,114,199.84	23,307,062.93	18.0	82.0	100.0
1936.....	3,192,498.46	20,286,615.75	23,479,114.21	13.6	86.4	100.0

## NATIONALITY OF VESSELS

Segregation of the ocean-going traffic through the Canal during the fiscal year 1936, by nationality, is presented in the following table which shows transits, measurement tonnage, tolls, and tons of cargo:

*Ocean-going traffic through the Panama Canal during fiscal year 1936, by nationality of vessels*

Nationality	Number of transits	Measurement tonnage				Tolls	Tons of cargo
		Panama Canal net	United States equivalent	Registered			
				Gross	Net		
Belgian.....	4	25,300	20,704	35,192	23,532	\$22,048.00	23,202
British.....	1,304	7,228,505	5,132,879	8,579,476	5,192,871	6,156,365.66	6,181,571
Chilean.....	19	67,981	51,897	95,456	55,630	64,871.25	79,456
Danish.....	156	722,128	457,417	779,550	477,140	554,914.02	627,407
Danzig.....	3	19,943	16,090	28,068	15,719	17,217.09	16,870
Ecuadorian.....	1	418	395	870	407	300.96	
Finnish.....	1					1,645.00	
French.....	99	578,782	376,084	704,358	389,756	460,877.48	544,343
German.....	310	1,243,710	847,072	1,465,649	868,006	1,067,367.44	1,305,090
Greek.....	48	220,393	160,374	253,632	156,528	189,041.14	238,310
Honduran.....	14	22,014	19,372	35,714	20,220	20,032.54	5,959
Hungarian.....	1	3,111	2,646	3,872	2,353	3,307.50	6,020
Italian.....	47	343,838	209,183	406,863	241,754	259,757.26	160,262
Japanese.....	271	1,607,914	1,196,490	1,928,220	1,191,313	1,479,731.33	1,697,880
Mexican.....	1					721.00	
Netherlands.....	139	609,973	413,285	697,436	416,307	495,782.63	511,620
Norwegian.....	556	2,622,289	1,763,118	2,937,747	1,765,574	2,079,501.09	2,717,860
Panamanian.....	201	654,890	509,701	917,578	506,418	570,231.74	654,610
Peruvian.....	4	6,560	5,916	8,620	4,676	7,395.00	4,109
Spanish.....	7	31,575	26,600	42,468	26,299	28,787.39	35,415
Swedish.....	131	615,596	426,810	1,050,872	520,868	488,048.29	855,409
United States.....	2,045	11,323,440	7,785,168	13,060,738	7,708,570	9,437,141.50	10,700,535
Venezuelan.....	4	4,324	4,232	8,168	4,320	4,181.40	3,845
Yugoslavian.....	16	71,733	55,878	89,712	55,685	69,847.50	136,170
Totals, fiscal year:							
1936.....	5,382	28,024,417	19,481,311	33,130,259	19,643,946	23,479,114.21	26,505,943
1935.....	5,180	27,865,588	19,428,658	33,013,356	19,609,276	23,307,062.93	25,309,527
1934.....	5,234	28,550,953	20,333,299	34,347,583	20,523,877	24,047,183.44	24,704,009

NOTE.—The above statement includes only ocean-going commercial traffic of 300 net tons and over, Panama Canal measurement, and foreign naval vessels of 500 tons displacement and over.

Segregating the traffic through the Canal by nationality of vessels, the following table shows the aggregate cargo carried by ships of the leading maritime nations during each of the past 5 fiscal years. For the year 1936, the percentage of total cargo carried by ships of each nationality is also shown:

*Tons of cargo carried*

Nationality	1932	1933	1934	1935	1936	
					Tons	Percentage
United States.....	8,835,055	7,987,739	11,578,453	10,825,573	10,700,535	40.4
British.....	4,637,388	4,170,995	5,193,136	5,776,021	6,181,571	23.3
Norwegian.....	1,427,284	1,773,161	2,080,833	2,463,675	2,717,860	10.3
Japanese.....	1,031,704	1,159,733	1,510,916	1,446,049	1,697,880	6.4
German.....	1,078,738	813,231	962,218	1,300,991	1,305,090	4.9
Swedish.....	761,015	403,169	766,921	782,548	855,409	3.2
Panamanian.....	44,328	61,950	136,405	121,758	654,610	2.5
Danish.....	521,481	448,863	533,262	555,981	627,407	2.4
French.....	338,586	249,395	430,471	570,034	544,343	2.1
Netherlands.....	440,870	381,071	403,451	439,168	511,620	1.9
All remaining.....	682,537	711,858	1,107,943	1,027,729	709,618	2.6
Total.....	19,798,986	18,161,165	24,704,009	25,309,527	26,505,943	100.0



Twenty-four nationalities were represented in the ocean-going commercial traffic passing through the Canal in 1936, compared with 21 in 1935 and 23 in 1934. As shown by the preceding tables, vessels of United States registry led in the number of transits; this has been the case for the past 18 years. From 1915 to 1918, inclusive, the first 4 years in which the Canal was open to traffic, transits of British vessels exceeded those of any other country, but United States vessels have led in transits ever since.

#### FOREIGN NAVAL VESSELS

In the Canal traffic statistics, foreign naval vessels such as colliers, transports, supply ships, etc., with a measurement of 300 net tons (Panama Canal measurement) or more, and foreign naval vessels such as battleships, cruisers, destroyers, submarines, etc., with a displacement measurement of 500 tons or more, are classified as ocean-going commercial vessels. Statistics on these vessels, except as relates to displacement tonnage, have been included in the traffic summaries shown on the preceding pages. As displacement tonnage cannot be combined with net tonnage, however, the following table shows foreign naval vessels transiting the Canal which paid tolls on the basis of displacement tonnage:

Nationality	Number of transits	Displacement tonnage	Tolls
British.....	9	49,672	\$24,836.00
Finnish.....	1	3,290	1,645.00
German.....	3	18,592	9,296.00
Mexican.....	1	1,442	721.00
Total.....	14	72,996	36,498.00

#### VESSELS ENTITLED TO FREE TRANSIT

Naval and other vessels owned and operated in the Government service of the United States and Panama, war vessels of Colombia, and vessels transiting solely for repairs at the Balboa shops, are exempt from the payment of tolls, and such vessels are not included in the general transit statistics in this section.

The following shows the vessels of each group, the measured tonnage, the amount of tolls to which they would have been subject at the prescribed rates if tolls had been charged against them, and the cargo carried by such vessels in ocean-to-ocean movement:

Class	Number of transits	Tonnage		Tolls	Tons of cargo
		Panama Canal net	Displacement		
U. S. Navy.....	274	286, 112	370, 575	\$425, 480. 91	75, 624
U. S. Army.....	151	406, 706	10, 648	357, 291. 75	30, 868
Other U. S. Government.....	1	-----	337	168. 50	-----
Total U. S. Government.....	426	692, 818	381, 560	782, 941. 16	106, 492
Colombian Government.....	8	13, 352	276	9, 549. 50	840
Solely for repairs.....	14	38, 318	-----	21, 649. 56	-----
Training ships.....	2	-----	9, 000	4, 500. 00	-----
Grand total.....	450	744, 488	390, 836	818, 640. 22	107, 332

## LOCAL COMMERCIAL TRAFFIC

Transits of small cargo-carrying vessels, and other small craft such as yachts, tugs, etc., of less than 300 tons Panama Canal measurement or less than 500 tons displacement measurement, are excluded from the statistics of ocean-going commercial traffic, although they are not exempt from the payment of tolls. The number of these small vessels transiting the Canal during the year, together with the tonnage, tolls, and amount of cargo carried, are shown in the following table:

	Number of transits	Tonnage		Tolls	Cargo tonnage
		Panama Canal net	Displacement		
Atlantic to Pacific: Local commercial.....	347	15, 908	-----	\$15, 175. 86	5, 641
Pacific to Atlantic: Local commercial.....	274	15, 558	-----	16, 336. 79	15, 062
Total.....	621	31, 466	-----	31, 512. 65	20, 703

## TRADE ROUTES AND CARGO

Cargo shipments through the Panama Canal during the fiscal year 1936 and in the 3 preceding years, segregated by principal trade routes, are shown in the following tabulation:

	Tons of cargo			
	1933	1934	1935	1936
United States intercoastal:				
Atlantic to Pacific.....	1, 595, 087	2, 074, 707	2, 162, 641	2, 578, 508
Pacific to Atlantic.....	4, 831, 521	6, 850, 261	5, 800, 769	5, 140, 567
Total.....	6, 426, 608	8, 924, 968	7, 963, 410	7, 719, 075
United States and Far East (including Philippine Islands):				
Atlantic to Pacific.....	1, 323, 003	1, 822, 955	2, 532, 280	2, 042, 491
Pacific to Atlantic.....	1, 077, 734	1, 535, 733	1, 067, 426	1, 395, 668
Total.....	2, 400, 737	3, 358, 688	3, 599, 706	3, 438, 159

	Tons of cargo			
	1933	1934	1935	1936
Europe and South America:				
Atlantic to Pacific.....	164, 695	212, 213	304, 212	395, 917
Pacific to Atlantic.....	1, 368, 234	2, 433, 350	2, 640, 962	2, 330, 136
Total.....	1, 532, 929	2, 645, 563	2, 945, 174	2, 726, 053
Europe and Canada:				
Atlantic to Pacific.....	70, 573	85, 153	77, 282	95, 142
Pacific to Atlantic.....	2, 788, 173	2, 010, 898	2, 335, 108	2, 377, 190
Total.....	2, 858, 746	2, 096, 051	2, 412, 390	2, 472, 332
Europe and United States:				
Atlantic to Pacific.....	249, 966	320, 366	379, 785	614, 703
Pacific to Atlantic.....	1, 700, 808	1, 530, 881	1, 388, 187	1, 788, 865
Total.....	1, 950, 774	1, 851, 247	1, 767, 972	2, 403, 568
East coast United States and west coast South America:				
Atlantic to Pacific.....	44, 474	108, 447	142, 870	199, 199
Pacific to Atlantic.....	294, 076	1, 633, 491	1, 380, 790	1, 969, 185
Total.....	338, 550	1, 741, 946	1, 523, 660	2, 108, 384
Europe and Australasia:				
Atlantic to Pacific.....	235, 075	252, 680	320, 280	419, 824
Pacific to Atlantic.....	295, 808	600, 931	615, 144	636, 997
Total.....	530, 971	853, 611	935, 424	1, 056, 821
United States and Hawaiian Islands:				
Atlantic to Pacific.....	63, 798	114, 227	111, 030	142, 774
Pacific to Atlantic.....	349, 938	381, 131	368, 024	371, 892
Total.....	413, 736	495, 358	479, 054	514, 666
United States and Australasia:				
Atlantic to Pacific.....	164, 215	211, 018	277, 477	356, 117
Pacific to Atlantic.....	18, 552	81, 303	152, 567	155, 875
Total.....	182, 767	292, 321	430, 044	511, 992
Miscellaneous routes and sailings:				
Atlantic to Pacific.....	596, 184	960, 883	1, 221, 864	1, 405, 224
Pacific to Atlantic.....	929, 163	1, 483, 373	2, 030, 829	2, 149, 669
Total.....	1, 525, 347	2, 444, 256	3, 252, 693	3, 554, 893
Total traffic, all routes:				
Atlantic to Pacific.....	4, 507, 070	6, 162, 649	7, 529, 721	8, 249, 899
Pacific to Atlantic.....	13, 654, 095	18, 541, 360	17, 779, 806	18, 256, 044
Total.....	18, 161, 165	24, 704, 009	25, 309, 527	26, 505, 943

## ORIGIN AND DESTINATION OF CARGO

The following tables show the origin and destination, by principal trade areas, of the cargoes carried by steamers passing through the Canal during the past fiscal year; one table covers the movement of cargo from the Atlantic to the Pacific, and the other from the Pacific to the Atlantic:

## Origin and destination of cargo through the Panama Canal during 1936 from Atlantic to Pacific, segregated by countries in principal trade areas

From—	To west coast, North America						To west coast, South America					
	United States	Canada	Central America and Mexico	Balboa <sup>1</sup>	Hawaiian Islands	Total	Chile	Colom-bia	Ecuador	Peru	South America <sup>2</sup>	Total
East coast North America:												
United States:												
North Atlantic ports.....	Tons 2,007,420	6,515	15,438	10,581	128,948	2,168,992	96,448	17,892	12,349	57,535	6,306	190,530
South Atlantic ports.....	75,410	1,340	4,588	211	3,240	84,789	2	109	109	109	111	111
Gulf ports.....	495,678	20,813		3,138	10,586	530,235	3,003			5,555		8,558
Total, United States.....	2,578,508	28,668	20,026	13,950	142,774	2,783,926	99,453	17,892	12,349	63,199	6,306	199,199
Canada.....	40,174	63,365				103,539	7,803	26	159	7,714		15,705
Central America and Mexico.....	3		22,545			22,548	18,146					18,278
Cristobal, Canal Zone <sup>1</sup> .....	13,725	327	42,593			56,645	27,322	25,874	19,135	21,309	792	94,632
West Indies.....	2,811	18,939	9,067	93,298	1	124,116	34,325	4,287	20,268	11,402		70,282
Total, North America.....	2,635,221	111,299	94,231	107,248	142,775	3,090,774	187,252	48,079	51,911	103,756	7,098	398,096
Europe:												
British Isles.....	65,039	63,308	418		4	128,769	48,612	2,159	4,136	21,544	327	76,778
Belgium.....	188,966	10,021	14,819	155	5,214	189,205	43,686	4,274	7,406	24,332	4,101	83,799
Denmark.....	2,221	152	17	860		3,250	275	8,911	8,084	118		17,388
France.....	8,641	992	264	17	18	9,932	3,301		12	688		4,015
Germany.....	98,531	3,122	32,313	273	3,522	137,761	44,268		18,349	39,813	13,009	128,341
Italy.....	7,572	432	240		29	8,273	1,258	6		1,192	223	2,679
Netherlands.....	15,142	4,374	12	176		19,904	10,400	1,535	1,364	11,937	396	25,632
Norway.....	45,072	1,029	1,251	3,644	1,417	52,413	2,010	4,018	1,142	923	60	8,153
Russia.....	126,487					126,487						
Spain and Portugal.....	4,489	7,277	105	49		11,920	1,384		1	750	210	2,345
Sweden.....	58,944	1,202	1,056	5,235	52	66,499	14,054	1,226	442	2,478	262	18,462
Europe <sup>2</sup> .....	23,599	3,033	3,746			30,378	7,225	2,522	4,147	5,027	9,404	28,325
Total Europe.....	614,703	95,142	54,281	10,409	10,256	784,791	176,473	37,553	45,083	108,802	28,006	395,917
East coast South America.....												
Asia.....	134,722	16,733	885	133	2	152,485	136,437	22,408	36	3,815	1,923	164,669
Egypt.....	2,383			4		2,386						
Grand total.....	3,387,380	223,174	149,397	117,797	153,033	4,030,781	500,212	108,040	97,030	216,373	37,027	958,682
Percent of total cargo 1936.....	41.1	2.7	1.8	1.4	1.9	48.9	6.1	1.3	1.2	2.6	0.4	11.6
Percent of total cargo 1935.....	35.8	2.3	2.0	1.0	1.6	42.7	5.2	.9	1.0	2.0	.7	9.8

From—	To Australasia					To Asia				Grand total	Percentage of total cargo	
	Aus- tralia	New Zea- land	Austral- asia 1	Total	Philip- pine Islands	China	Japan	Far East 2	Total		1936	1935
East coast North America:												
United States:												
North Atlantic ports.....	198,789	58,141	5,867	262,777	149,340	131,688	766,863	9,660	1,063,561	3,687,770	44.7	44.9
South Atlantic ports.....	3,591	1,570	1,570	7,161	13,175	12,312	139,089	7,327	173,103	263,164	3.2	2.6
Gulf ports.....	70,710	15,469		86,179	7,619	45,984	725,126	25,098	803,827	1,428,799	17.3	22.5
Total, United States.....	273,070	73,610	7,437	356,117	170,134	197,994	1,031,678	42,685	2,042,491	5,381,733	65.2	70.0
Canada.....	99,488	39,209	3,066	141,763	26	3,699	34,095	57	37,877	298,884	3.6	3.3
Central America and Mexico.....	67,907	19,389		87,296			22,966		22,966	160,718	1.9	1.9
Cristobal, C. Z. <sup>1</sup> .....	729	66	141	936			5,959	1,227	7,186	159,399	1.9	2.1
West Indies.....	36	24,299	10	24,345	3	33,563	38,010	3	71,579	290,322	3.5	2.9
Total, North America.....	443,230	156,573	10,654	610,457	170,163	235,256	1,732,338	43,972	2,181,729	6,281,056	76.1	80.2
Europe:												
British Isles.....		364,634	21,504	386,138						591,685	7.2	6.7
Belgium.....		8,174	843	9,017		466	105		571	282,592	3.4	2.6
Denmark.....										20,698	.3	.3
France.....		120	8,658	8,778						22,725	.3	.3
Germany.....		322		322			16,507		16,507	282,931	3.4	2.7
Italy.....		6,900		6,900	11				11	17,863	.2	.3
Netherlands.....		10		10			1,631		1,631	47,177	.6	.5
Norway.....		83		83						60,649	.7	.7
Russia.....										126,457	1.5	.6
Spain and Portugal.....		210		210						14,475	1.2	1.1
Sweden.....		1,048		1,048			600		600	86,609	1.0	1.0
Europe 2.....		7,318		7,318						66,021	.8	.7
Total, Europe.....		388,819	31,005	419,824	11	466	18,843		19,320	1,619,852	19.6	16.5
East coast South America.....	84	7	1,577	1,577		96	27,041	294	27,431	344,683	4.2	3.3
Asia.....										3,903	.1	
Egypt.....										345		
Grand total.....	443,314	545,399	43,243	1,031,956	170,174	235,818	1,778,222	44,266	2,228,480	8,249,899	100.0	100.0
Percent of total cargo 1936.....	5.4	6.6	0.5	12.5	2.1	2.8	21.6	0.5	27.0	100.0		
Percent of total cargo 1935.....	4.8	5.5	.5	10.8	1.8	4.0	29.7	1.2	36.7	100.0		

1 Includes both local and transit cargo.

2 General cargo not routed so as to allow segregation between definite countries.

Origin and destination of cargo through the Panama Canal during 1936 from Pacific to Atlantic, segregated by countries in principal trade areas

From—	To United States				To other North America				To Europe			
	North Atlantic ports	South Atlantic ports	Gulf ports	Total	Canada	Central America and Mexico	Cris- total, Canal Zone 1	West Indies	Total North America	British Isles	Belgium	Den- mark
	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons
West Coast North America:												
United States.....	4,407,152	250,201	483,214	5,140,567	3,165	819	50,999	182,965	5,384,515	959,186	79,017	16,916
Canada.....	153,656	1,358	35,961	190,975	56,212	594	4,153	39,191	291,125	1,996,337	103,335	10,416
Central America and Mexico.....	29,397	1,551	16,233	47,181	90	90	27,404	7,792	82,467	210	646	390
Balboa, Canal Zone 1.....	292,739	—	—	371,892	—	—	—	82	371,998	—	—	—
Hawaiian Islands.....	—	—	79,133	—	—	—	24	—	—	82,503	—	—
Total, North America.....	4,882,944	253,110	614,561	5,750,615	59,377	1,503	88,580	230,036	6,130,111	3,038,236	182,998	27,722
West Coast South America:												
Chile.....	1,439,811	244,256	80,950	1,765,017	—	362	15,916	22,319	1,803,614	194,581	79,319	8,732
Colombia.....	19,937	—	333	20,270	—	—	58,466	—	78,736	276	555	78
Ecuador.....	38,914	—	3,347	42,261	—	—	45,006	67	87,334	23,752	221	8
Peru.....	68,631	—	—	68,631	—	30	7,521	183,838	660,733	458,759	85,729	32,714
South America 1.....	13,006	—	—	13,006	—	—	4,890	252	18,148	16,883	351	—
Total, South America.....	1,580,299	244,256	84,630	1,909,185	390,713	392	131,799	216,476	2,648,565	694,251	166,175	41,532
Australasia:												
Australia.....	89,257	—	—	89,257	33,158	—	1,577	7,742	131,734	29,711	8,625	—
New Zealand.....	25,815	—	—	25,815	7,475	—	721	211	34,222	390,308	571	—
Australasia 1.....	39,211	—	1,592	40,803	—	—	—	80	40,883	77,778	—	1,038
Total, Australasia.....	154,283	—	1,592	155,875	40,633	—	2,298	8,033	206,839	497,797	9,196	1,038
Asia:												
Philippine Islands.....	575,352	1,344	233,011	809,707	74	—	437	123	810,341	—	—	—
China.....	150,215	2,540	4,952	157,707	7,156	—	7,838	589	173,290	48,443	—	15,786
Japan.....	291,368	9,006	5,770	306,144	205	687	24,611	3,533	335,180	6,899	—	—
Far East 1.....	108,542	—	13,568	122,110	8,515	—	1,314	11,657	143,596	6,704	—	—
Total, Asia.....	1,125,477	12,890	257,301	1,395,668	15,950	687	34,200	15,902	1,462,407	62,106	—	15,786
Grand total.....	7,743,003	510,256	988,084	9,211,343	506,673	2,582	256,877	470,447	10,447,922	4,292,390	358,369	86,078
Percentage of total cargo, 1936.....	42.4	2.8	5.3	50.5	2.8	—	1.4	2.5	57.2	23.5	1.9	1.9
Percentage of total cargo, 1935.....	42.8	2.6	4.4	49.8	3.1	—	1.4	2.1	56.4	22.2	1.7	1.5



From—	To Europe								To miscellaneous areas				Percentage of total cargo			
	France	Ger- many	Italy	Nether- lands	Nor- way	Spain and Portu- gal	Sweden	Europe <sup>2</sup>	Total	South Amer- ica	Egypt	Asia	Africa <sup>3</sup>	Grand total	1936	1935
West coast North America:																
United States:	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons	Tons		
Canada:	191,507	182,487	35,157	92,023	8,175	13,146	29,181	182,070	1,788,865	44,378	677			7,249,299	39.7	42.4
Central America and Mexico:	26,821	29,305	11,084	69,495	322	2,927	6,153	120,995	2,377,190	4,185				2,705,567	14.8	14.7
Balboa Canal Zone <sup>1</sup> :	5,585	23,515	295	698			5,896	10,241	47,476	3				129,946	.7	.7
Hawaiian Islands:		173							82,901					454,899	2.6	2.3
Total, North America:	223,913	235,480	46,536	162,216	8,497	16,073	41,628	313,306	4,296,005	48,566	677	6,700	57,231	10,539,890	57.8	59.4
West coast South America:																
Chile:	49,089	85,732	9,138	25,465	7,928	13,540	37,059	470,063	980,646	188				2,920,638	15.9	14.5
Colombia:	164	3,983		151		8		204	5,019	265				84,020	.5	.4
Ecuador:	29,494	1,704	477	287		57	3	18,418	74,421					167,755	.9	1.1
Peru:	506,769	38,958	824	43,798	18,371	76	39	44,477	1,230,514	1,944				1,893,191	10.4	10.7
South America <sup>2</sup> :	2,705	692		2,737	5,000			11,168	39,536					57,684	.3	.2
Total, South America:	588,221	130,669	10,439	72,438	31,299	13,681	37,101	544,330	2,330,136	2,397	136,190			5,117,288	28.0	26.9
Australasia:																
Australia:	103							2,654	41,098					172,832	.9	.8
New Zealand:	4,671	271		750				4,489	401,060					435,282	2.4	2.8
Australasia <sup>2</sup> :	38,895	2,500		7,324			19,600	47,704	194,839					235,722	1.3	1.1
Total, Australasia:	43,674	2,771		8,074			19,600	54,847	636,997					843,836	4.6	4.7
Asia:																
Philippine Islands:																
China:	12,763	15,611		12,042			12,213	128,434	245,292	106				810,341	4.4	3.2
Japan:		443		212				6,600	14,154	862				418,688	2.3	2.4
Far East <sup>2</sup> :								22,931	29,695	2,514				350,196	1.9	2.0
Total Asia:	12,763	16,054		12,254			12,213	157,965	289,141	3,482				1,755,030	9.6	9.0
Grand total:	898,571	384,974	56,975	254,982	39,796	29,754	110,542	1,070,448	7,552,879	54,445	136,867	6,700	57,231	18,256,044	100.0	100.0
Percent of total cargo, 1936:	5.0	2.1	0.3	1.4	0.2	0.2	0.6	5.8	41.4	0.3	0.8		0.3	100.0		
Percent of total cargo, 1935:	4.5	1.4	0.3	1.1	0.3	0.2	0.6	9.5	42.3	0.4	0.6		0.3	100.0		

<sup>1</sup> Includes both local and transit cargo.<sup>2</sup> General cargo not routed so as to allow segregation between definite countries.<sup>3</sup> Other than Egypt.

## PRINCIPAL COMMODITIES

Statistics of commodities passing through the Canal are not precise because at the time of transit it is not required that complete manifests of cargo carried by vessels be submitted to the Canal authorities. In lieu of a manifest the master of each vessel is required to submit a cargo declaration, which is a briefly itemized statement, listing the principal items of cargo carried and showing their ports or country of origin and destination. These cargo declarations form the basis of the commodity statistics. There is a natural tendency not to list small miscellaneous shipments but to include them under the head of general cargo; not infrequently no other classification is made of the entire cargoes carried by vessels. Hence, except in the case of commodities commonly shipped in bulk, such as mineral oils carried in tank ships, wheat, lumber, nitrates, etc., shipments of various goods are likely to be in excess of the aggregate tonnage reported during the year and shown in the annual summary. Subject to errors arising from this source, the tonnage of the principal commodities shipped through the Canal during the past 4 years is shown in the following table:

*Commodity movement*

Commodity	Fiscal year ended June 30—			
	1933	1934	1935	1936
ATLANTIC TO PACIFIC	<i>Long tons</i>	<i>Long tons</i>	<i>Long tons</i>	<i>Long tons</i>
Manufactures of iron and steel.....	502, 503	982, 596	1, 114, 189	1, 379, 363
Mineral oils.....	407, 492	550, 469	605, 595	678, 607
Scrap metal.....	273, 375	503, 277	1, 186, 061	646, 464
Paper and paper products.....	214, 568	256, 449	347, 424	397, 196
Cotton, raw.....	432, 043	492, 459	362, 548	331, 989
Phosphates.....	154, 145	188, 320	255, 033	289, 870
Tinplate.....	108, 500	241, 851	199, 495	246, 902
Sulphur.....	149, 790	206, 509	208, 678	224, 734
Ores, various.....	28, 053	27, 572	97, 502	214, 711
Automobiles.....	50, 731	90, 111	131, 341	204, 996
Metals, various.....	30, 662	60, 140	175, 066	169, 141
Asphalt and tar.....	47, 748	61, 581	113, 305	139, 864
Ammonium compounds.....	35, 002	56, 331	76, 073	137, 338
Machinery.....	54, 781	87, 285	112, 339	137, 261
Canned goods (fish, fruit, vegetables, etc.).....	101, 751	106, 869	121, 478	135, 627
Coal and coke.....	85, 548	110, 294	97, 582	132, 956
Cement.....	69, 105	85, 456	103, 808	126, 596
Chemicals.....	64, 072	87, 652	98, 907	116, 066
Textiles.....	78, 555	98, 269	96, 269	108, 733
Nitrate.....	45, 295	69, 164	58, 461	103, 178
Automobile accessories.....	35, 237	65, 217	79, 818	100, 625
Sugar.....	40, 256	75, 770	50, 052	94, 607
Liquors and wines.....	15, 431	25, 972	60, 034	66, 130
Glass and glassware.....	47, 374	51, 548	53, 824	65, 202
Sand.....	23, 519	31, 225	31, 967	63, 992
Coffee.....	54, 491	64, 624	52, 670	61, 503
Railroad material.....	18, 265	42, 350	28, 125	61, 274
Wood pulp.....	38, 986	38, 947	45, 222	55, 529
Rosin.....	38, 024	43, 834	47, 527	55, 527
Tobacco.....	67, 548	72, 006	52, 611	51, 707
Salt.....	30, 263	60, 018	53, 931	48, 485
Lumber and mill products.....	21, 826	27, 729	26, 776	47, 835
Creosote.....	15, 315	14, 626	38, 395	44, 615
Potash.....	16, 497	14, 041	15, 369	43, 826
Paints and varnishes.....	8, 676	14, 740	26, 265	38, 496
Corn.....	128, 331	42, 241	104, 783	38, 072
Soda and sodium compounds.....	25, 892	32, 484	25, 909	37, 255
Agricultural implements.....	11, 567	25, 246	32, 037	36, 556
Oils, vegetable.....	39, 132	38, 751	39, 434	30, 939
Fertilizers (unclassified).....	10, 103	26, 555	13, 304	28, 204
Soap and products.....	28, 631	24, 505	23, 746	21, 429
All other.....	857, 987	967, 563	1, 066, 965	1, 236, 499
Total.....	4, 507, 070	6, 162, 649	7, 529, 721	8, 249, 899

*Commodity movement—Continued*

Commodity	Fiscal year ended June 30—			
	1933	1934	1935	1936
<i>Long tons</i>				
PACIFIC TO ATLANTIC				
Mineral oils.....	3,506,356	5,443,271	4,342,231	3,277,078
Lumber.....	1,549,483	2,148,020	2,165,835	2,764,091
Ores.....	90,518	1,224,135	1,080,144	1,466,021
Wheat.....	2,368,892	1,371,258	1,533,056	1,480,187
Sugar.....	1,667,496	1,773,137	1,212,145	1,391,909
Nitrate.....	186,783	1,059,425	1,146,848	1,181,197
Canned goods (fish, fruit, vegetables, etc.).....	865,716	882,254	937,172	1,050,855
Metals, various.....	376,396	511,759	608,122	599,388
Flour.....	180,858	270,531	319,655	337,487
Fruit, fresh.....	285,523	311,530	270,606	336,367
Food products in cold storage <sup>1</sup> .....	162,143	357,058	363,745	324,092
Fruit, dried.....	314,061	307,714	261,116	309,096
Soybeans.....	39,593	206,005	433,322	239,860
Barley.....	209,890	197,183	200,030	221,624
Oils, vegetable.....	95,473	154,710	193,470	221,255
Beans, edible, dry.....	103,522	128,473	130,649	171,444
Wood pulp.....	106,329	135,214	129,771	164,001
Wool.....	97,852	155,627	122,234	161,528
Coffee.....	152,735	140,907	137,081	158,315
Molasses and sirups.....	7,667	46,485	66,517	132,302
Paper and paper products.....	98,997	110,095	118,588	131,368
Copra.....	80,789	103,904	102,397	126,591
Cotton, raw.....	64,931	78,018	78,282	120,014
Borax.....	66,205	80,512	94,716	101,012
Rubber, raw.....	1,214	6,475	40,033	98,914
Skins and hides.....	52,509	62,271	64,123	72,782
Oats.....	79,898	90,034	155,881	69,916
Bananas.....	13,049	40,627	40,177	66,153
Oilseed cake and meal.....	33,542	44,412	76,539	62,687
Phosphates.....	2,935	6,168	30,405	58,175
Asphalt and tar.....	14,244	22,179	47,929	52,302
Fish meal.....	6,037	40,694	75,593	51,922
Porcelain ware.....	24,137	36,213	46,152	50,194
Rice.....	34,267	47,128	81,192	45,614
All other.....	714,055	947,334	1,073,990	1,130,303
Total.....	13,654,095	18,541,360	17,779,806	18,256,044

<sup>1</sup> Does not include fresh fruit.

## CLASSIFICATION OF VESSELS

## LADEN AND BALLAST TRAFFIC

The following table summarizes the ocean-going commercial traffic through the Canal during the fiscal year 1936 segregated between laden ships and those in ballast, as well as between tankers, general cargo, and those not designed to carry cargo, and between United States and all other nationalities.

Classification	United States traffic			Foreign traffic			Total traffic		
	Atlantic to Pacific	Pacific to Atlantic	Total	Atlantic to Pacific	Pacific to Atlantic	Total	Atlantic to Pacific	Pacific to Atlantic	Total
Tank ships, laden:									
Number of transits.....	26	120	146	44	181	225	70	301	371
Panama Canal net tonnage.....	133,574	680,589	814,163	208,351	1,088,281	1,296,632	341,925	1,768,870	2,110,795
United States equivalent net tonnage.....	106,791	566,377	673,168	175,559	916,113	1,091,672	282,350	1,482,490	1,764,840
Tolls.....	\$131,457.25	\$707,421.25	\$838,878.50	\$217,318.41	\$1,144,982.15	\$1,362,300.56	\$348,775.66	\$1,852,403.40	\$2,201,179.06
Cargo (tons).....	166,619	1,291,591	1,458,210	330,151	2,165,434	2,495,585	496,770	3,457,025	3,953,795
Tank ships, ballast:									
Number of transits.....	100	4	104	119	4	123	219	8	227
Panama Canal net tonnage.....	575,766	22,046	597,812	766,291	12,690	778,981	1,342,057	34,646	1,376,703
United States equivalent net tonnage.....	479,202	17,075	496,277	644,239	10,652	654,891	1,123,441	27,727	1,151,168
Tolls.....	\$414,551.52	\$15,873.12	\$430,424.64	\$551,792.40	\$9,102.36	\$560,894.76	\$966,343.92	\$24,975.48	\$991,319.40
All other cargo ships, laden:									
Number of transits.....	848	876	1,724	1,134	1,405	2,539	1,982	2,281	4,263
Panama Canal net tonnage.....	4,832,887	4,823,706	9,656,593	5,831,518	6,865,060	12,696,578	10,664,405	11,682,556	22,353,201
United States equivalent net tonnage.....	3,143,620	3,248,186	6,391,806	3,883,193	4,689,771	8,572,964	7,026,813	7,933,957	14,962,770
Tolls.....	\$3,929,525.00	\$4,052,108.70	\$7,981,633.70	\$4,845,102.27	\$5,855,911.85	\$10,701,184.12	\$8,774,717.27	\$9,908,100.35	\$18,682,877.82
Cargo (tons).....	3,194,176	6,048,149	9,242,325	4,588,953	8,750,870	13,339,823	7,753,129	14,793,019	22,552,148
All other cargo ships, ballast:									
Number of transits.....	62	1	63	424	10	434	486	11	497
Panama Canal net tonnage.....	243,457	3,374	246,831	1,911,725	15,915	1,927,640	2,155,182	19,289	2,174,471
United States equivalent net tonnage.....	216,988	2,701	219,689	1,302,255	13,399	1,315,654	1,579,243	16,100	1,595,343
Tolls.....	\$177,990.66	\$2,429.28	\$180,419.94	\$1,368,733.59	\$11,471.76	\$1,380,205.35	\$1,546,724.25	\$13,901.04	\$1,560,625.29
Yachts, ballast:									
Number of transits.....	4	4	8	1	1	1	4	5	9
Panama Canal net tonnage.....	3,674	4,277	7,951	818	818	1,636	3,674	5,095	8,769
United States equivalent net tonnage.....	2,776	3,452	6,228	567	567	1,134	2,776	4,019	6,795
Tolls.....	\$2,645.28	\$3,079.44	\$5,724.72	-----	\$588.96	\$588.96	\$2,645.28	\$3,668.40	\$6,313.68
Training ships, ballast:									
Number of transits.....	-----	-----	-----	1	-----	1	1	-----	1
Panama Canal net tonnage.....	-----	-----	-----	418	-----	418	418	-----	418
United States equivalent net tonnage.....	-----	-----	-----	395	-----	395	-----	-----	395
Tolls.....	-----	-----	-----	\$300.96	-----	\$300.96	\$300.96	-----	\$300.96
Naval vessels:									
Number of transits.....	-----	-----	-----	8	6	14	8	6	14
Displacement tonnage.....	-----	-----	-----	42,524	30,472	72,996	42,524	30,472	72,996
Tolls.....	-----	-----	-----	\$21,262.00	\$15,236.00	\$36,498.00	\$21,262.00	\$15,236.00	\$36,498.00



## BALLAST AND LADEN TRAFFIC BY NATIONALITY

In the table below, which shows traffic through the Canal by flag, the ships of each nationality have been segregated to show separate statistics on vessels which were carrying cargo at the time of transiting the Canal and those which passed through the Canal in ballast:

*Laden*

Nationality	Number of transits	Tonnage				Tolls
		Panama Canal, net	United States equivalent	Registered		
				Gross	Net	
Belgian.....	2	12, 650	10, 352	17, 596	11, 766	\$12, 940. 00
British.....	1, 009	5, 781, 879	4, 075, 510	6, 837, 409	4, 144, 899	5, 092, 416. 35
Chilean.....	19	67, 981	51, 897	95, 456	55, 630	64, 871. 25
Danish.....	126	593, 038	371, 364	637, 122	389, 432	464, 102. 65
Danzig.....	1	7, 796	6, 777	12, 097	6, 802	8, 471. 25
French.....	95	551, 848	353, 188	665, 916	368, 451	441, 485. 00
German.....	306	1, 236, 458	842, 280	1, 457, 380	862, 988	1, 052, 850. 00
Greek.....	32	141, 631	105, 866	164, 723	101, 844	132, 332. 50
Honduran.....	7	11, 007	9, 686	17, 857	10, 108	12, 107. 50
Hungarian.....	1	3, 111	2, 646	3, 872	2, 353	3, 307. 50
Italian.....	46	339, 005	205, 022	399, 900	237, 726	256, 277. 50
Japanese.....	261	1, 552, 945	1, 152, 910	1, 863, 072	1, 147, 306	1, 440, 153. 65
Netherlands.....	122	530, 294	350, 731	594, 268	355, 107	438, 413. 75
Norwegian.....	452	2, 146, 813	1, 401, 024	2, 341, 877	1, 405, 586	1, 739, 811. 18
Panamanian.....	164	460, 607	344, 659	616, 981	341, 369	430, 718. 95
Peruvian.....	4	6, 560	5, 916	8, 620	4, 676	7, 395. 00
Spanish.....	4	17, 813	15, 103	24, 291	14, 815	18, 878. 75
Swedish.....	95	457, 879	301, 711	675, 617	371, 727	374, 510. 00
United States.....	1, 870	10, 470, 846	7, 062, 974	11, 838, 259	6, 987, 765	8, 820, 572. 20
Venezuelan.....	2	2, 162	2, 116	4, 084	2, 160	2, 594. 40
Yugoslav.....	16	71, 733	55, 878	89, 712	55, 685	69, 847. 50
Total, 1936.....	4, 634	24, 464, 056	16, 727, 610	28, 366, 109	16, 878, 195	20, 884, 056. 88
Total, 1935.....	4, 442	24, 086, 156	16, 466, 948	27, 947, 104	16, 649, 925	20, 580, 029. 46

*Ballast*

Belgian.....	2	12, 650	10, 352	17, 596	11, 766	\$9, 108. 00
British.....	286	1, 446, 626	1, 057, 369	1, 742, 067	1, 047, 972	1, 039, 113. 31
Danish.....	30	129, 090	86, 053	142, 428	87, 708	90, 811. 37
Danzig.....	2	12, 147	9, 313	15, 971	8, 917	8, 745. 84
Ecuadorian.....	1	418	395	870	407	300. 96
French.....	4	26, 934	22, 896	38, 442	21, 305	19, 392. 48
German.....	1	7, 252	4, 792	8, 269	5, 018	5, 221. 44
Greek.....	16	78, 762	54, 508	88, 909	54, 684	56, 708. 64
Honduran.....	7	11, 007	9, 686	17, 857	10, 112	7, 925. 04
Italian.....	1	4, 833	4, 161	6, 963	4, 028	3, 479. 76
Japanese.....	10	54, 969	43, 580	65, 148	44, 007	39, 577. 68
Netherlands.....	17	79, 679	62, 554	103, 168	61, 200	57, 368. 88
Norwegian.....	104	475, 476	362, 094	595, 870	359, 988	339, 689. 91
Panamanian.....	37	194, 283	165, 042	300, 597	165, 049	139, 512. 79
Spanish.....	3	13, 762	11, 497	18, 177	11, 484	9, 908. 64
Swedish.....	36	157, 717	125, 099	375, 255	149, 141	113, 538. 29
United States.....	175	852, 594	722, 194	1, 222, 479	720, 805	616, 569. 30
Venezuelan.....	2	2, 162	2, 116	4, 084	2, 160	1, 587. 00
Total, 1936.....	734	3, 560, 361	2, 753, 701	4, 764, 150	2, 765, 751	2, 558, 559. 33
Total, 1935.....	717	3, 719, 432	2, 961, 710	5, 066, 252	2, 959, 351	2, 676, 253. 97

NOTE.—14 vessels paying on displacement tonnage are not included in above statements.

AVERAGE TONNAGE, TOLLS, AND TONS OF CARGO PER CARGO-CARRYING  
VESSEL

The average measurement tonnage, tolls, and tons of cargo per cargo-carrying vessel of 300 net tons and over, Panama Canal meas-

urement, transiting the Panama Canal during the past 3 years are shown in the following tabulation.

	Fiscal year 1934	Fiscal year 1935	Fiscal year 1936
Measured tonnage:			
Panama Canal net.....	5,482	5,405	5,229
United States net.....	3,903	3,776	3,635
Registered gross.....	6,592	6,416	6,180
Registered net.....	3,940	3,811	3,665
Tolls.....	\$4,611.57	\$4,522.93	\$4,377.05
Tons of cargo (including vessels in ballast).....	4,744	4,921	4,947
Tons of cargo (laden vessels only).....	5,831	5,703	5,752

NOTE.—Computation of above averages is based on cargo-carrying vessels only; craft not engaged in commerce, such as yachts, naval vessels, etc., are not considered.

#### STEAM, MOTOR AND OTHER VESSELS

Of the 5,382 ocean-going commercial vessels transiting the Canal during the fiscal year, 3,430 were steamers, 1,928 motorships, and the remainder, 24, were unclassified naval vessels, yachts, etc. For the past 5 years the proportions of these classes have been as follows:

	1932	1933	1934	1935	1936
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Steamers.....	67.0	63.2	65.6	63.4	63.7
Motorships.....	32.4	36.4	33.9	33.8	35.8
Miscellaneous.....	.6	.4	.5	.8	.5
Total.....	100.0	100.0	100.0	100.0	100.0

Of the 3,430 steamers transiting the Canal during the past fiscal year, 2,499 burned oil and 931 burned coal. For the past 5 years the proportions of each class have been as follows:

	1932	1933	1934	1935	1936
	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>	<i>Percent</i>
Oil burning.....	76.1	70.6	76.2	74.8	72.9
Coal burning.....	22.1	27.2	22.6	24.3	27.1
Either oil or coal.....	1.8	2.2	1.2	.9	—
Total.....	100.0	100.0	100.0	100.0	100.0

#### SUMMARY OF PASSENGER MOVEMENT AT CANAL DURING 1936

The following tabulation shows by months the number of passengers, exclusive of transients, disembarking and embarking at Canal Zone ports during the fiscal year 1936, segregated as between first class and all others, with comparative totals for the fiscal years 1935 and 1934:

	Disembarking			Embarking		
	First-class	Others	Total	First class	Others	Total
July.....	1,834	1,064	2,898	1,783	1,072	2,855
August.....	1,868	903	2,771	1,947	967	2,914
September.....	1,795	1,783	3,578	1,829	1,337	3,166
October.....	1,677	1,181	2,858	1,265	1,193	2,458
November.....	1,536	1,135	2,671	1,350	1,028	2,378
December.....	1,491	1,565	3,056	1,364	1,020	2,384
January.....	1,574	1,152	2,726	1,302	708	2,010
February.....	1,753	1,191	2,944	1,606	1,448	3,054
March.....	1,477	842	2,319	1,676	1,101	2,777
April.....	1,455	1,873	3,328	1,626	1,142	2,768
May.....	1,419	1,116	2,535	2,103	1,921	4,024
June.....	1,721	1,330	3,051	2,011	1,352	3,363
Total, 1936.....	19,600	15,135	34,735	19,862	14,289	34,151
Total, 1935.....	18,163	16,674	34,837	17,703	16,216	33,919
Total, 1934.....	16,646	12,182	28,828	16,463	13,509	29,972

As compared with 1935, the fiscal year 1936 shows a decrease of 0.3 of 1 percent in the number of arrivals, and in comparison with 1934 it showed an increase of 20.5 percent; in the number of departures there was a gain of 0.7 of 1 percent over 1935 and a 13.9 percent increase over 1934.

The following table shows the passenger traffic through the ports of Cristobal and Balboa during the past 3 years:

	Port of Cristobal			Port of Balboa		
	1934	1935	1936	1934	1935	1936
Passengers disembarking.....	18,898	22,693	23,811	9,930	12,144	10,924
Passengers embarking.....	19,156	21,053	22,267	10,816	12,866	11,884

A further segregation of the passenger movement shows that 24,836 incoming and 23,477 outgoing passengers came from or were destined to ports of the Atlantic, and 9,899 incoming and 10,674 outgoing passengers were brought from or were destined to ports of the Pacific.

#### TRANSIENT PASSENGERS

In addition to the figures shown above of passengers disembarking and embarking, there were 132,590 transient passengers brought to the Isthmus by vessels calling at Canal ports during the fiscal year 1936. For the fiscal year 1935, this number was 120,906, and in the fiscal year 1934, 101,934. The number in 1936 increased 11,684, or 9.7 percent in comparison with those in 1935, and made a gain of 30,656, or 30.1 percent, over 1934. Most of these passengers came ashore for short periods but since they departed on the same vessels on which they arrived they are not included in the tabulation of passengers ending or beginning voyages at the Isthmus. The origin



and destination of these transient passengers are indicated in the following tabulation:

	Total		Fiscal year 1936		
	1934	1935	Cristobal	Balboa	Total
Remaining on board vessels transiting Canal:					
Atlantic to Pacific.....	38, 114	49, 711	56, 001		56, 001
Pacific to Atlantic.....	31, 390	39, 336		40, 117	40, 117
Remaining on board vessels entering port, but not transiting Canal:					
Atlantic to Atlantic ports.....	30, 804	29, 165	33, 788		33, 788
Pacific to Pacific ports.....	1, 626	2, 694		2, 684	2, 684
Total.....	101, 934	120, 906	89, 789	42, 801	132, 590

NOTE.—In passengers remaining on board vessels transiting Canal, those from the Atlantic to Pacific are taken up at Cristobal, and those from the Pacific to Atlantic at Balboa, that is, at the port of arrival from sea, and not again at the other terminus of the Canal.

Among the transient passengers was a number visiting the Canal as members of special tourist cruises. Many of these crossed the Isthmus by train from Colon to Gatun, proceeding from there through the Gaillard Cut to Pedro Miguel by small steamer, and finally completing the trip to Balboa by rail or automobile. Similar combination trips were made in the opposite direction. During the past year 56 trips of this type were conducted, for a total of 8,390 passengers.

#### FREQUENCY OF TRANSITS OF VESSELS THROUGH THE PANAMA CANAL

During the fiscal year 1936, 1,381 individual ocean-going commercial vessels, representing 24 nationalities, passed through the Panama Canal: in the aggregate these vessels made a total of 5,382 transits. The number of transits made by individual ships varied from 1 to 88, and averaged 3.90. The largest number, amounting to 88, was made by the small Panamanian steamer *Istmo*, plying between Cristobal and the west coast of Colombia.

Although vessels of United States registry led in the number of transits during the year, Great Britain, which ranked second, was first in the number of individual vessels, with 523. There were 345 individual vessels of United States registry which passed through during the year.

The following table shows the number of individual ships, the frequency of transits per vessel, the total transits for the year, and the average number of transits per individual vessel, segregated by nationality:

## Vessels making indicated number of transits during fiscal year 1936

Nationality	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	24	25	26	27	28	29	31	32	34	35	36	63	88	Total ships	Total transits	Average number of transits	
Belgian				1									1	1																				1	523	4	4.00	
British	204	154	56	34		26	6	4	1														2										3	1,304	2.49	6.33		
Chilean	1								2																								39	156	4.00	1.00		
Danish	5	10	3	9	3	3	2	1																									3	1	1.00	1.00		
Danzig	3																																	1	1	1.00	1.00	
Ecuadorian	1																																	22	99	4.50	4.50	
Finnish	2	4	2	1	2	8	3																										68	310	4.56	1.85		
French	18	15	7	8	3	2	10	1																									26	48	1.85	7.00		
German	12	8	4	2																														2	14	7.00	1.00	
Greek																																		1	1	1.00	4.27	
Honduran																																		11	47	4.27	3.99	
Hungarian	1	3																																68	271	3.99	1.00	
Italian	2	3																																33	139	4.21	3.56	
Japanese	8	12	5	11	12	20																												156	556	3.56	4.00	
Mexican	1																																	1	1	1.00	1.75	
Netherlands	6	13																																28	131	4.68	5.93	
Norwegian	47	32	18	12	14	7	10	4	6	1	2	1																						345	2,045	4.00	4.00	
Panamanian	7	9	1	6	1	1	3	1	2																									1	1	1.00	4.00	
Peruvian																																		4	7	1.75	4.68	
Spanish	1	3																																28	131	4.68	5.93	
Swedish	7	6	2																															345	2,045	4.00	4.00	
United States	31	50	22	37	29	32	55	29	26	8	2	1	1	3																				11	16	1.45	3.90	
Venezuelan																																				1,381	5,382	3.75
Yugoslav	6	5																																	1,379	5,180	3.87	
Total, 1936	364	324	120	128	104	110	95	40	37	15	5	2	2	5	4	8	6	1	1	1	1	1	1	2	3	1	1	1	1	1	1	1	1	1,381	5,382	3.90	3.75	
Total, 1935	367	337	116	142	83	147	55	46	27	21	6	3	3	1	3	7	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1,379	5,180	3.87	3.87	
Total, 1934	318	337	124	156	94	120	65	42	29	16	7	12	8	2	3	4	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1,353	5,234	3.87	3.87	

The following tabulation shows for the fiscal year 1936 the number of vessels making one or more transits through the Panama Canal, the percent which each class formed of the total number of vessels (1,381), their aggregate number of transits, and their percent of the total ocean-going commercial transits (5,382):

Number of transits	Number of vessels	Percent of individual vessels (1,381)	Total number of transits	Percent of total Canal transits (5,382)	Number of transits	Number of vessels	Percent of individual vessels (1,381)	Total number of transits	Percent of total Canal transits (5,382)
1.....	364	26.4	364	6.8	16.....	4	.3	64	1.2
2.....	324	23.5	648	12.0	17.....	8	.6	136	2.5
3.....	120	8.7	360	6.7	18.....	6	.4	108	2.0
4.....	128	9.3	512	9.5	19.....	1	.1	19	.4
5.....	104	7.5	520	9.7	20.....	1	.1	20	.4
6.....	110	8.0	660	12.3	22.....	1	.1	22	.4
7.....	95	6.9	665	12.4	25.....	2	.1	50	.9
8.....	40	2.9	320	5.9	26.....	3	.2	78	1.4
9.....	37	2.6	333	6.2	27.....	1	.1	27	.5
10.....	15	1.1	150	2.8	28.....	1	.1	28	.5
11.....	5	.3	55	1.0	35.....	1	.1	35	.7
12.....	2	.1	24	.4	88.....	1	.1	88	1.6
13.....	2	.1	26	.5					
14.....	5	.3	70	1.3	Total.	1,381	100.0	5,382	100.0

## NET TONNAGE OF VESSELS

The 5,382 ocean-going commercial vessels which transited the Canal in the fiscal year 1936 included 5,368 merchant vessels, yachts, etc., paying on the basis of net tonnage, and 14 naval vessels paying tolls on the basis of displacement tonnage. Of the 5,368 ocean-going commercial transits paying tolls on net tonnage, 53.8 percent was of vessels of from 4,000 to 6,000 net tons, Panama Canal measurement. Vessels under 1,000 net tons made 4.0 percent of the total transits, and 2.7 percent was made by vessels of 10,000 tons and over. The average tonnage of all transits was 5,221 as compared with 5,390 in the previous fiscal year, a decrease of 3.1 percent.

The following tabulation shows the ocean-going commercial vessels, excluding naval vessels, in groups according to net tonnage, Panama Canal measurement, segregated by nationality, with average tonnages and group percentages for the fiscal years 1936 and 1935:

## Number of transits in net tonnage groups

Nationality	300 to 999, inclusive	1,000 to 1,999, inclusive	2,000 to 2,999, inclusive	3,000 to 3,999, inclusive	4,000 to 4,999, inclusive	5,000 to 5,999, inclusive	6,000 to 6,999, inclusive	7,000 to 7,999, inclusive	8,000 to 8,999, inclusive	9,000 to 9,999, inclusive	10,000 and over	Total <sup>1</sup>	Panama Canal net tonnage	Average Panama Canal net tonnage	
														Fiscal year 1936	Fiscal year 1935
Belgian.....	54	10	20	42	511	305	115	4	89	40	62	4	25,300	6,325	5,725
British.....	---	---	---	18	---	---	---	---	---	---	---	1,295	7,228,505	3,582	3,819
Chilean.....	---	1	---	---	---	---	---	---	---	---	---	19	67,981	3,578	540
Colombian.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Danish.....	---	41	8	3	43	23	7	4	27	---	---	156	722,128	4,629	4,748
Danzig.....	---	---	---	---	1	---	---	---	---	---	---	3	19,943	6,648	7,922
Ecuadorian.....	1	---	---	---	---	---	---	---	---	---	---	1	418	418	---
Finnish.....	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
French.....	---	---	---	1	45	12	7	32	2	---	---	99	578,782	5,846	4,851
German.....	51	63	7	11	34	40	77	22	---	---	2	307	1,243,710	4,051	5,908
Greek.....	---	---	---	8	31	5	4	---	---	---	---	48	220,393	4,592	3,873
Honduran.....	---	14	---	---	---	---	---	---	---	---	---	14	22,014	1,572	4,157
Hungarian.....	---	---	---	1	---	---	---	---	---	---	---	1	---	---	---
Italian.....	---	---	---	---	3	---	25	---	---	19	---	47	343,838	3,111	6,333
Japanese.....	---	---	---	37	137	92	137	5	---	---	---	271	1,607,914	7,316	5,818
Netherlands.....	---	47	2	---	13	21	28	14	14	---	---	139	609,973	5,933	5,818
Norwegian.....	---	32	47	---	58	133	95	17	---	---	---	556	2,622,289	4,716	4,809
Panamanian.....	96	2	12	20	4	1	27	19	22	---	---	201	654,890	3,258	4,814
Peruvian.....	---	4	---	---	---	---	---	---	---	---	---	4	6,560	1,982	1,982
Polish.....	---	---	---	---	---	---	---	---	---	---	---	---	---	1,640	1,088
Spanish.....	---	---	---	7	---	---	---	---	---	---	---	---	---	---	---
Swedish.....	---	---	5	15	65	44	2	---	---	---	---	7	31,575	4,511	5,563
United States.....	7	49	149	66	700	529	310	37	33	82	83	131	615,596	4,699	4,921
Venezuelan.....	---	---	---	---	---	---	---	---	---	---	---	2,045	11,323,440	5,537	5,724
Yugoslav.....	---	4	---	---	14	---	---	---	---	---	---	16	4,324	1,081	1,081
Total.....	213	267	250	243	1,675	1,207	838	241	146	141	147	5,368	28,024,417	5,221	5,390
Percent of total:	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
1936.....	4.0	5.0	4.6	4.5	31.3	22.5	15.6	4.5	2.7	2.6	2.7	100.0	---	---	---
1935.....	4.5	2.8	4.5	4.4	28.9	24.5	15.9	5.2	3.3	2.7	3.3	100.0	---	---	---

<sup>1</sup> 14 naval vessels—9 British, 1 Finnish, 3 German, and 1 Mexican—paying tolls on displacement tonnage, are not included.

## HOURS OF OPERATION

Dispatching of ships through the Canal is conducted on schedules. Vessels awaiting transit begin moving through the Canal from the terminal ports at 6 a. m. and dispatches are made thereafter from each terminus at intervals of about half an hour. The following is a summary of the arrangements in effect at the end of the fiscal year:

From Cristobal Harbor, first ship at 6 a. m., last at about 3:30 p. m.; from Balboa anchorage, first ship at 6 a. m., last at 2:30 p. m. This applies to vessels averaging 10 to 12 knots. In case a vessel is capable of 15 knots, departure may be made up to about 3 p. m. from Balboa and 4 p. m. from Cristobal.

Tankers with inflammable cargoes are dispatched at the discretion of the captain of the port and are not permitted to proceed unless they can clear Gaillard Cut before dark. Overloaded tankers carrying gasoline cargo are usually restricted to the early morning schedules, leaving at 6, 6:30, and 7 a. m., but may be dispatched on other schedules if the conditions of traffic necessitate a change.

The volume of traffic at present is not sufficient to justify night operation.

## LOCKAGES AND LOCK MAINTENANCE

Lockages and vessels handled, by months, during the past fiscal year, are shown in the following table, to which is appended for comparison a statement of the totals for the preceding 5 fiscal years:

Month	Gatun		Pedro Miguel		Miraflores		Total	
	Lockages	Vessels	Lockages	Vessels	Lockages	Vessels	Lockages	Vessels
<b>1935</b>								
July.....	381	468	399	479	400	484	1,180	1,431
August.....	396	493	414	519	415	523	1,225	1,535
September.....	399	485	407	498	404	499	1,210	1,482
October.....	444	548	470	583	466	584	1,380	1,715
November.....	425	515	439	529	436	535	1,300	1,579
December.....	447	553	460	571	460	569	1,367	1,693
<b>1936</b>								
January.....	475	573	484	593	483	571	1,442	1,737
February.....	431	574	459	602	463	598	1,353	1,774
March.....	506	647	524	637	517	631	1,547	1,915
April.....	468	595	483	603	490	607	1,441	1,805
May.....	494	698	516	696	518	678	1,528	2,072
June.....	468	606	493	620	486	587	1,447	1,813
<b>Total.....</b>	<b>5,334</b>	<b>6,755</b>	<b>5,548</b>	<b>6,930</b>	<b>5,538</b>	<b>6,866</b>	<b>16,420</b>	<b>20,551</b>
<b>Fiscal year:</b>								
1931.....	5,571	6,477	5,824	6,667	5,783	6,651	17,178	19,795
1932.....	4,615	5,349	4,842	5,576	4,826	5,575	14,283	16,500
1933.....	4,380	5,334	4,557	5,536	4,505	5,586	13,442	16,466
1934.....	5,365	6,593	5,507	6,745	5,483	6,705	16,355	20,043
1935.....	5,316	6,893	5,490	6,859	5,481	6,837	16,287	20,589

In the fiscal year 1936 the average numbers of lockages per day were as follows: Gatun, 14.6; Pedro Miguel, 15.2; Miraflores, 15.1.

In the fiscal year 1935, average numbers of lockages per day were: Gatun 14.6; Pedro Miguel, 15.0; Miraflores, 15.0.

The average number of vessels locked per lockage in the fiscal year was as follows: Gatun, 1.266; Pedro Miguel, 1.249; Miraflores, 1.239. The average for the total of 16,420 lockages was 1.2515 vessels.

#### ATLANTIC LOCKS

The operating shifts remained the same throughout the year.

On account of heavy traffic, it was necessary to use part of the maintenance force as operating crews 51 days during the year. The crews were called upon for overtime work 35 times during the year, ranging from 4 minutes to 1 hour, 48 minutes, and totaling 19 hours and 12 minutes for the year.

Eleven northbound commercial ships were delayed a total of 2 hours, 7 minutes, ranging from 2 to 43 minutes; and 20 southbound commercial ships were delayed a total of 2 hours, 6 minutes, ranging from 2 to 20 minutes.

#### PACIFIC LOCKS

Operation continued on the same basis as during the preceding year.

At Pedro Miguel, seven northbound commercial vessels were delayed a total of 53 minutes, ranging from 2 to 30 minutes; and four southbound commercial ships were delayed a total of 28 minutes, ranging from 2 to 20 minutes. At Miraflores, five northbound commercial ships were delayed a total of 52 minutes, ranging from 5 to 20 minutes; and nine southbound commercial ships, a total of 1 hour, 9 minutes, ranging from 3 to 15 minutes.

No serious breakdowns occurred during the year at any of the locks. Routine maintenance and repairs were performed on all machinery and equipment; monthly test operations were made on the emergency dams at all locks.

#### POWER FOR CANAL OPERATION

The power system was operated throughout the year with a combined generator output of 73,902,935 kilowatt-hours, as compared with a combined generator output of 69,192,508 kilowatt-hours for the last fiscal year. A total of 66,861,986 kilowatt-hours was distributed to consumers as compared with 62,921,157 kilowatt-hours for the previous year. Transmission, transformation, and distribution loss amounted to 7,040,949 kilowatt-hours, or 9.52 percent, during the year, compared with a loss of 6,271,351 kilowatt-hours, or 9.06 percent, during the previous year.

The Gatun hydroelectric station was run throughout the year, carrying the full load of the power system except during operation of the Miraflores Diesel-electric station for the purpose of water conservation from March 9 to May 5, 1936, and during the periods from September 19, 1935, to January 21, 1936, and April 25, 1936, to the close of the fiscal year, during which periods the Madden hydroelectric station was used. There were two minor interruptions to service at the Gatun hydroelectric station during the year, due to loss of excitation and bushing failure, and lasting less than five minutes each.

The Madden hydroelectric station which had not been in operation since March 1935 was again in service during September 1935 and continued until January 1936. By this date Madden Lake had fallen to an elevation of 140 feet, which was too low to permit generation of power. However, this station was again placed in service during April 1936 and continued operating throughout the remainder of the fiscal year.

The Miraflores Diesel-electric station was maintained on a standby and peak-load service during the year in addition to being utilized for water conservation purposes.

Interruptions to transmission-line service during the year totaled 21, as compared with 14 for the previous year. Eight of these failures were caused by lightning, three by flashovers, four by animals climbing the tower, one by insulator having been damaged by rifle fire, one by defective insulator string, two by mechanical failure of insulators, and two were undetermined.

Work was completed in connection with the installation of two 5,333-kilovolt ampere transformers at the Balboa substation, including the installation of two new high-tension oil circuit breakers, four low-tension oil circuit breakers and an overhead electric crane, the two latter items of equipment having been recovered from the old Gatun substation. In addition to increasing the transformers' capacity from 4,000 to 5,333 kilovolt amperes, considered necessary for present requirements, the installation released a 2,667-kilovolt ampere transformer for use as a spare at the Miraflores and Cristobal substations.

The importance of the Summit substation as a unit in the power transmission and distribution system has been greatly accentuated by the placing of the Navy's high-powered radio station on the distribution system fed from this substation. In order to provide the best possible service to the naval radio station and to dredging division activities in Gaillard Cut, considerable work was performed during the year toward modernizing the substation, including the installation of an additional oil circuit breaker and twelve 46-kilovolt manually-operated disconnecting switches.

To provide increased capacity at the Gamboa substation, made necessary by the construction of the new townsite at Gamboa, the substation equipment which was formerly housed in the Gamboa pump-station building was removed and rebuilt in a modernized outdoor station. This modernization included installation of three 667-kilo-volt ampere transformers formerly in service at the old Madden substation, two motor-operated disconnecting switches formerly in service at the Summit substation, and 12 new hand-operated disconnecting switches and two new oil circuit breakers.

### WATER SUPPLY

The inflow of water into Gatun Lake from all sources during the year, representing 161 percent of the capacity of the lake at elevation 87 feet, and the utilization and losses of the water in the lake, are summarized in the following table. There are also shown the percentages which each item formed of the total yield or total consumption. The data are presented for the fiscal years 1935 and 1936 for purpose of comparison. Each year covers 12 months ending June 30, and thus embraces the cycle of both a dry and a rainy season.

	Billion cubic feet, fiscal year—		Percent of total, fiscal year—	
	1935	1936	1935	1936
Run-off above Madden Dam.....	76.98	122.58	34.4	39.5
Yield from land area below Madden Dam.....	102.29	138.41	45.8	44.6
Direct rainfall on the lake surface.....	44.05	49.43	19.8	15.9
Total yield.....	223.32	310.42	100.0	100.0
Evaporation from lake surface.....	21.09	20.55	9.4	6.6
Gatun Lake lockages.....	39.85	36.28	17.9	11.7
Hydroelectric power.....	51.38	35.72	23.0	11.5
Spillway waste.....	106.80	215.29	47.8	69.4
Leakage and municipal.....	1.52	2.11	.7	.7
Increase in storage.....	2.68	.47	1.2	.1
Total.....	223.32	310.42	100.0	100.0

Operation of the Gatun spillway during the fiscal year 1936 totaled 5,875 gate-hours, and of the Miraflores spillway, 452 gate-hours.

### DRY SEASON—1936

From a water-supply standpoint, the 1936 dry season began on December 28, 1935, and ended on May 3, 1936, the total duration being 128 days. This is 15 days longer than the dry season of the previous year and approximately the same length as the average dry season which begins about December 30 and ends about May 7. The net yield (total yield minus evaporation) of the Gatun Lake watershed was 524 cubic feet per second, or 37 percent below the 23-year average of 831 cubic feet per second. The total yield was



1,350 cubic feet per second, of which 56 percent was furnished by the inflow from the Madden Lake drainage area. The loss from evaporation amounted to 61 percent of the total yield. The lowest elevation of Gatun Lake was 81.90 feet on May 3.

During the month of January, practically all the Madden Lake storage was emptied into Gatun Lake in order that repairs to the Madden Dam sluiceways could be made during the dry season. Gatun Lake was filled to elevation 87 feet and the excess Madden Lake storage was spilled over the Gatun spillway. Moderate water saving at the locks was begun in February and continued throughout the dry season, saving approximately 0.38 feet on Gatun Lake. Saving by the Diesel power plant at Miraflores began on March 9 and continued throughout the season, saving the equivalent of approximately 0.43 feet on Gatun Lake. Slow filling of Madden Lake began on April 14 and 752 million cubic feet (the equivalent of 0.17 feet on Gatun Lake) was stored during the remainder of the dry season. Madden power plant began operation on April 25, using the natural stream flow of the Madden Lake watershed, thereby saving the equivalent of about 0.05 foot on Gatun Lake, by furnishing power that would have otherwise been generated at Gatun. Had there been no water saving during the period, Gatun Lake's lowest elevation would have been 81.21 feet.

#### FLOODS

A series of comparatively large floods occurred during the latter half of November and the first part of December. The maximum momentary inflow from the Madden Lake watershed was approximately 110,000 cubic feet per second on November 17. This momentary inflow has been exceeded several times during the past 30 years, but from the standpoint of duration, the floods of November and December were the largest since American occupation and comparable to the flood period experienced by the French in December 1888. The total yield of the 1,320 square miles of the Gatun Lake watershed area during the series of floods from November 13 to 24, inclusive, was 73.6 billion cubic feet. During this 12-day period the yield from the watershed was greater than that of any whole monthly period in which a major flood occurred since the formation of Gatun Lake. During November and December the yield of the Madden Lake watershed was 63 billion cubic feet, enough water to have filled Madden Lake from empty to full (elevation 95 to elevation 240 feet) approximately three times. During the same period the yield of the whole Gatun Lake watershed was 152 billion cubic feet, approximately 0.8 of the capacity of Gatun Lake at elevation 87.00 feet.

## MADDEN LAKE

Slow filling of Madden Lake was continued during the 1935 dry season from an initial elevation of 235.00 feet on January 1. A maximum elevation of 240.36 feet was reached on February 3. Emptying of the lake began on this date and was completed March 28, during which lowering process various spillway, sluiceway, needle valve, and turbine tests were made. The lake remained approximately empty until August in order that repair work could be performed on the sluiceways, after which it was filled and kept at an approximate elevation of 170 feet until the major floods of November and early December caused it to rise above the elevation of the drum-gate sills, resulting in a maximum elevation of 237.51 feet on November 23. During the period December 6, 1935, to February 26, 1936, the lake was lowered to elevation 118 feet, at which height it was maintained until the middle of April when it was raised and maintained at an approximate elevation of 170 feet to the end of the fiscal year 1936.

## MADDEN LAKE WATERSHED RIDGE AND POWER INVESTIGATION SURVEY

During the 1936 dry season a ridge-line survey of the Chagres River area was made at an approximate cost of \$23,000. A total of 81 miles of ridge reconnaissance, 50 miles of ridge stadia transit line, and 28 miles of river stadia transit line was run. In addition, considerable work was done on river profile and cross sections. There remains unsurveyed 10 miles of the watershed ridge and 5 miles of the Chagres River. Figured on a one-party basis, 353 days were spent on this survey.

## MADDEN DAM PROJECT

Minor and special features of the project, which by their nature could not be completed with the main part of the construction, were continued under several of the Canal divisions. The work was supervised by the designing engineer.

The crevices in the ridges of the reservoir area, extending from the dam northward for three-quarters of a mile, were tightened by clay grouting; this project was completed on January 15. As a result of the grouting there was very slight seepage and it is believed that the danger from leakage has been eliminated in this area.

Recent explorations of the rest of the Madden Lake area have limited the zones of danger from leakage to a single location. This is the same point which geologists had previously indicated as a possible source of trouble. A thorough exploration of this location showed that it contains a limestone formation extending through the ridge between the Azote Caballo and Chilibrillo Rivers, and

that crevices of an appreciable width exist and consequently this area shows a relatively greater leakage than other ungrouted areas. In order to determine the underground conditions a test pit and six cored holes were drilled and a weir was placed in the mouth of the test pit; water levels are now being recorded in the pit and holes, as a means of measuring the rate of seepage.

The dam was cooled by means of circulating the natural river water through pipes, which are later to be used for injecting cement grout. This cooling process considerably reduced the time which would otherwise have been required to relieve the dam of sufficient chemical heat before grouting the joints. Work on cement grouting and contraction joints began in August 1936. Mr. A. W. Simonds, an engineer of the United States Bureau of Reclamation, was engaged as a consultant on the grouting to advise and assist the Canal organization.

The erosion resulting from cavitation action in the sluiceways was completely repaired during the 1936 dry season, Madden Lake being kept at a low level about  $2\frac{1}{2}$  months during this work. No further modifications in the designs of the entrances were made except to install steel covers over the stop log slots which pass into the bell-mouth form of entrance for sluiceways nos. 5 and 6.

During July and August 1935 the reservoir was kept lower than the spillway crest, after which it was allowed to rise until half full in order to cool the dam. A series of freshets caused the lake to fill completely beginning about August 24 and it was not dropped to the half-way level until January 1. For  $2\frac{1}{2}$  months in the 1936 dry season the lake was held low to repair sluiceways.

The lake's elevation while below spillway level was regulated by means of two power turbines and the discharge of two needle valves. When the level was too low for these operations, it was controlled by means of the six sluiceways. No difficulty with trash was experienced except that caused by strong currents near the dam during the past wet season when the lake remained at a low level.

Some of the engineering personnel from the organization of the former Madden Dam division were retained for several months to complete the records and reports on tests relating to special features of the dam. Several articles about this project were later accepted for publication.

The general contractors for the construction of Madden Dam petitioned the Court of Claims on December 2, 1935, to recover \$508,081.17, alleged to be owed them for performance of the contract. All reports on the items claimed were completed.

## MAINTENANCE OF CHANNEL AND IMPROVEMENT PROJECTS

In addition to the maintenance of the Canal channel, dredging activities during the year included auxiliary dredging for the United States Navy at Balboa, and dredging in the Cristobal and Balboa inner harbors and the Cristobal outer harbor.

Excavation during the fiscal year is summarized in the following table:

*Canal prism dredging*

Location	Maintenance		
	Earth	Rock	Total
Gatun Lake:			
Maintenance.....	1, 228, 650	114, 400	<sup>1</sup> 1, 343, 050
Project no. 3.....	549, 850	204, 900	754, 750
Gaillard Cut:			
Maintenance (including slides).....	362, 200	203, 550	565, 750
Project no. 3.....	10, 630	14, 020	24, 650
Project no. 5.....	14, 450	136, 500	150, 950
Project no. 13.....	297, 000	332, 800	629, 800
Miraflores Lake:			
Maintenance.....	427, 000	-----	427, 000
Project no. 6.....	450, 800	29, 200	480, 000
Pacific entrance:			
Maintenance.....	841, 335	11, 000	852, 335
Total, Canal prism dredging.....	4, 181, 915	1, 046, 370	5, 228, 285

*Auxiliary dredging*

Cristobal outer harbor:			
Project no. 11 (maintenance).....	5, 300	99, 100	104, 400
Cristobal inner harbor:			
Maintenance.....	49, 000	-----	49, 000
Balboa inner harbor:			
Maintenance.....	381, 400	-----	381, 400
United States Navy, Balboa.....	837, 150	246, 900	1, 084, 050
Total, auxiliary dredging.....	1, 272, 850	346, 000	<sup>2</sup> 1, 618, 850
Grand total.....	5, 454, 765	1, 392, 370	6, 847, 135

<sup>1</sup> Does not include 210,350 cubic yards of rehandled material.

<sup>2</sup> In addition, 5,615 cubic yards of Chamé sand were produced by craneboat *Atlas*.

Dredging operations in the Canal are divided into three major districts: The northern district, from contour 42 feet below mean sea level in the Atlantic Ocean to Gamboa; the central district, Gaillard Cut, from Gamboa to Pedro Miguel Locks; the southern district, from Pedro Miguel Locks to contour 50 feet below mean sea level in the Pacific Ocean. Excavation in these three districts is summarized as follows:

	Canal prism			Auxiliary			Total		
	Earth	Rock	Total	Earth	Rock	Total	Earth	Rock	Total
Northern...	<i>Cubic yards</i> 1, 778, 500	<i>Cubic yards</i> 319, 300	<i>Cubic yards</i> 2, 097, 800	<i>Cubic yards</i> 54, 300	<i>Cubic yards</i> 99, 100	<i>Cubic yards</i> 153, 400	<i>Cubic yards</i> 1, 832, 800	<i>Cubic yards</i> 418, 400	<i>Cubic yards</i> 2, 251, 200
Central...	684, 280	686, 870	1, 371, 150	-----	-----	-----	684, 280	686, 870	1, 371, 150
Southern...	1, 719, 135	40, 200	1, 759, 335	1, 218, 550	246, 900	1, 465, 450	2, 937, 685	287, 100	3, 224, 785
Total.	4, 181, 915	1, 046, 370	5, 228, 285	1, 272, 850	346, 000	1, 618, 850	5, 454, 765	1, 392, 370	6, 847, 135

<sup>1</sup> Does not include 210,350 cubic yards of rehandled material.

<sup>2</sup> Does not include 5,615 cubic yards of Chamé sand produced.

#### CANAL IMPROVEMENT WORK

*Project no. 1.*—This project, consisting of deepening the Pacific entrance channel from Miraflores Locks to the sea buoys and including the Balboa inner harbor, from a depth of 45 feet to a ruling depth of 50 feet (mean sea level datum), was begun in the harbor in July 1924, and in the Pacific entrance in November 1924. Various additions known as Projects 1-A and 1-B, Pacific entrance, and Project no. 1-A, Balboa Harbor, were subsequently authorized as described in the annual report for the fiscal year 1931. There was no dredging or mining in Project no. 1, Pacific entrance, or Balboa Harbor during the fiscal year. At the end of the year excavation on the Pacific entrance portion of this project was 83.2 percent completed and the harbor 90 percent completed. Excavation for the entire project was 84.2 percent completed.

*Project no. 3.*—This project consists of widening the channel at the north entrance of Gaillard Cut and extending northward, terminating at the south end of Gamboa Reach. Work on this project was started during September 1929. The total excavation for the year on Project no. 3 (Gatun Lake and Gaillard Cut) was 779,400 cubic yards. The project was completed during February 1936 with a grand total of 2,733,500 cubic yards of material removed from the original project and its extensions.

*Project no. 5 (revised).*—This project, which involves widening the Gaillard Cut approach to Pedro Miguel Locks, was started in December 1930. Excavation during the year amounted to 150,950 cubic yards, the work on the project being 97.8 percent completed at the end of the fiscal year.

*Project no. 6.*—This project, consisting of widening Miraflores Lake Channel, was begun in April 1932. The total excavation for the year on this project was 480,000 cubic yards, of which 48,000 cubic yards were anticipated fill. The work was 90 percent complete at the end of the year.

*Project no. 11.*—This project, which consists of removing various shoal areas in the outer portions of Cristobal Harbor, was started in September 1934. The total excavation on this project for the fiscal year 1936 was 104,400 cubic yards, the work on the project being 24 percent completed at the end of the fiscal year.

*Project no. 13.*—This project, which consists of widening the entire Culebra Reach of Gaillard Cut by 200 feet, was started in January 1935. The total excavation for the year on this project was 629,800 cubic yards, and at the end of the year the project was 8.1 percent completed.

#### MAINTENANCE

*Gaillard Cut.*—The pipe line suction dredge *Las Cruces* worked  $7\frac{1}{2}$  days on clean-up work in Gaillard Cut, excavating a total of 138,000 cubic yards of earth and rock. Two dipper dredges worked a total of 112 days on general clean-up work in Gaillard Cut, excavating a total of 260,700 cubic yards of earth and rock.

*Atlantic entrance, Cristobal Harbor and Gatun Lake.*—There was no dredging in the Atlantic entrance during the fiscal year. In the Cristobal Harbor and approach channel the crane boat *Atlas*, operating as a drag suction dredge, worked  $25\frac{1}{4}$  days excavating 49,000 cubic yards of sand and silt. In the Gatun Lake sector the pipe line suction dredge *Las Cruces* worked  $74\frac{1}{2}$  days on clean-up work excavating a total of 1,138,000 cubic yards of earth and soft rock. Of this total amount, 437,000 cubic yards were deposited on the new townsite of Gamboa. Three dipper dredges worked a total of  $118\frac{1}{4}$  days on clean-up work in the Gatun Lake area, excavating a total of 415,400 cubic yards of earth and rock.

*Pacific entrance, Balboa Harbor and Miraflores Lake.*—A total of 851,500 cubic yards of material was excavated from the Pacific entrance by the suction dredge *Las Cruces* and crane boat *Atlas* operating as a drag suction dredge. A derrick barge worked  $7\frac{1}{2}$  days in the east ferry slip in the Pacific entrance, excavating 835 cubic yards of silt. In Balboa Harbor the suction dredge worked 17 days on clean-up work, excavating 381,400 cubic yards of mud and silt. In Miraflores Lake the pipe-line suction dredge worked 25 days on clean-up work, excavating a total of 427,000 cubic yards of mud and silt.

#### SLIDES

The total excavation from slides in Gaillard Cut in the fiscal year 1936 was 167,050 cubic yards. Excessive rainfall during the month of November resulted in pronounced movement in 10 different slides, 4 of which caused shoaling of the Canal channel. There was no interference to shipping on account of slides during the year.

Details of the excavation from slides during 1936, together with the total material excavated from June 30, 1913, to the end of the past fiscal year, are presented in the following table:

Slide	Fiscal year 1936			Total to date		
	Earth	Rock	Total	Earth	Rock	Total
Haut Obispo slide (east).....				6, 700	5, 500	12, 200
Buena Vista slide (west).....				5, 500		5, 500
Buena Vista slide (east).....				12, 100	17, 550	29, 650
Cascadas slide (east).....				8, 350	46, 800	55, 150
White House slide (east).....	2, 800	3, 200	6, 000	26, 650	41, 050	67, 700
White House slide (west).....				21, 000	100, 550	121, 550
Powder house slide (east).....				104, 650	312, 150	416, 800
La Pita slide (east).....				12, 300	96, 700	109, 000
La Pita slide (west).....				4, 550	42, 900	47, 450
Empire slide (east).....				34, 050	228, 050	262, 100
Lirio slide (east).....	32, 750	35, 850	68, 600	82, 300	157, 000	239, 300
Division office slide (west).....				4, 150	19, 450	23, 600
Lirio slide (west).....				570, 450	1, 987, 750	2, 558, 200
Culebra slide (east).....				2, 674, 050	17, 943, 900	20, 617, 950
Culebra slide (west).....	16, 200	34, 200	50, 400	1, 469, 500	9, 501, 700	10, 971, 200
Culebra slide extension (east).....	3, 000	12, 300	15, 300	422, 150	976, 200	1, 398, 350
Barge repair slide (east).....	3, 200	4, 200	7, 400	208, 750	474, 850	683, 600
Contractors Hill (north).....				13, 800	139, 600	153, 400
Contractors Hill (west).....				7, 900	31, 600	39, 500
Cucaracha slide (east).....				2, 492, 950	6, 851, 400	9, 344, 350
Cucaracha signal station slide (west).....				35, 500	204, 600	240, 100
South Cucaracha slide (east).....	9, 750	9, 600	19, 350	56, 250	123, 800	180, 050
Cucaracha Village slide (east).....				33, 400	77, 400	110, 800
Paraiso slide (east).....				1, 950	7, 250	9, 200
Cartagena slide (west).....				56, 400	245, 700	302, 100
Total.....	67, 700	99, 350	167, 050	8, 365, 350	39, 633, 450	47, 998, 800

Numerous small bank breaks and surface movements occurred at various points throughout Gaillard Cut during the year. This was true particularly during the unusually heavy rains in November when erosion of the banks generally throughout the Cut was very pronounced and a considerable amount of material entered the prism from this cause. Daily inspections and reports were made of all portions of active slide areas fronting the Canal as well as a periodical inspection of the entire surface of all slides. Drainage conditions were investigated and corrected when possible.

#### AUXILIARY DREDGING

The pipe line suction dredge *Las Cruces* worked 111 days in the United States Navy's depot slip at Balboa, excavating a total of 819,000 cubic yards of earth and soft rock. The dipper dredge *Cascadas* worked 80 days on the same project, excavating 265,050 cubic yards of earth and rock.

#### SUBSIDIARY DREDGING DIVISION ACTIVITIES

At the Chagres River gravel plant at Gamboa 200,746 cubic yards of sand and gravel were on hand at the beginning of the year. During the year 51,364 cubic yards were shipped, leaving a balance on July 1, 1936, of 149,382 cubic yards.

The crane boat *Atlas* made six trips to Chamé, dredging a total of 5,615 cubic yards of sand which was transported in barges to Balboa for use of the supply department.

The work of removing floating obstructions and water hyacinths in Gaillard Cut, Miraflores and Gatun Lakes was continued throughout the year; the number of hyacinth plants destroyed during the year by pulling or spraying was estimated at 43,183,300. A copper sulphate solution was used for spraying.

During the year an unusually large amount of driftwood, accumulated from clearing operations in the Madden Dam lake area, was allowed to spill over the Madden Dam and was collected at the new trash boom across the Chagres River Channel above Gamboa Bridge. This material was diverted into an arm of the lake on the south side of the river and was subsequently piled in a convenient place for burning. The driftwood pile, estimated at more than 1,000 cords, was not burned during the dry season as it had not dried sufficiently.

In connection with proposed repairs to the Atlantic breakwaters, 130 6½ foot by 6½ foot by 6½ foot concrete blocks were manufactured at the Gamboa gravel plant during the fiscal year, for future use. During the month of June, 734 concrete blocks of various sizes, which were in storage on the Cristobal Mole, were placed at needed points on the east breakwater.

### EQUIPMENT

The following floating equipment was employed during the fiscal year: Three 15-yard dipper dredges, *Cascadas*, *Gamboa*, and *Paraiso*, operated 10.4 months, 2.8 months, and 10.8 months, respectively. The 24-inch pipe-line suction dredge *Las Cruces* was operated 11.2 months during the year. The craneboat *Atlas* was operated for 3.25 months in dredging on general maintenance work; in addition it made six trips to Chamé for sand and, with the exception of a total 1.4 months in reserve or under repairs, spent the remainder of the fiscal year in miscellaneous services of transportation, towing, rigging, and salvaging. Derrick barge *No. 157* was in service for 2.9 months during the year; hydraulic grader *No. 3* was in service or standing by for 1.9 months; the new hydraulic grader *No. 4* was 4 months undergoing minor construction revisions and installations previous to being commissioned and was in service or standing by for 8 months; the drill boat *Terrier No. 2* was in continuous service throughout the year, except for 21 days boiler wash and repair time; air compressor *No. 29* was in service or standing by during the entire year; excavator *No. 1* was in active service for 7 months of the year; excavator *No. 2* was in active service for 5.5 months of the year; the 250-ton cranes *Ajax* and *Hercules* were operated on alternate months except when calls for



extra services required the commissioning of both; the three large tugs *Trinidad*, *Chagres*, and *Mariner*, together with the three smaller tugs *Indio*, *Bohio*, and *Siri*, and nine launches were operated during the year. The Diesel ferryboats *President Roosevelt* and *Presidente Amador* were engaged in operation of the ferry service at Balboa during the year.

#### GAMBOA DREDGING STATION AND TOWNSITE

Work on the development of the new dredging station and townsite located at Gamboa, at the junction of the Chagres River and the Canal, was in progress during the year. This program was more fully described in the report for the fiscal year 1935. The project involves the installation of new water-front facilities to replace those at Paraiso, including shop buildings, storehouses, repair dock, and small boat landings. It also involves the building of quarters and community buildings for 180 American and 630 native workers and their families.

With the completion of this project some 2 years hence, the dredging division will be located at the most advantageous point available, both from the standpoint of maintenance of the channel and the security of moored equipment, as the new station is between any possible point of closure of Gaillard Cut, from slides, and spoil dumps in Gatun Lake; and in addition, equipment moored or under repairs will be protected from damage by transiting vessels in contrast with the existing exposed conditions at Paraiso.

Municipal work, electrical work, and erection of quarters and industrial buildings are discussed in other sections of this report.

#### FERRY SERVICE

Ferry service across the Pacific entrance of the Canal, connecting La Boca, Balboa, and Panama City on the east bank of the Canal with Thatcher Highway on the west bank, was operated by the dredging division throughout the year. The ferries made a total of 29,143 single trips during the year, carrying 8,084 Panama Canal, 16,260 United States Army, and 238,799 other vehicles, a total of 263,143, as compared with 203,220 during the previous fiscal year. Passengers carried totaled 1,404,202, as compared with 1,052,663 during the previous fiscal year.

Owing to the constantly increasing traffic demands, the ferry service was increased on July 1, 1935, to afford 24-hour service.

#### AIDS TO NAVIGATION

Maintenance of the navigational aids for vessels operating in the Canal and adjacent waters involved 144 gas, 284 electric, and 265

unlighted aids, representing increases during the fiscal year of approximately 9 percent and 12 percent, respectively, in the number of gas and electric aids, and a decrease of 3 percent in the number of unlighted aids.

The lighthouse tender U. S. S. *Favorite* made three visits during the year to Jicarita Island and Morro Puercos Lighthouses which are operated for the United States Department of Commerce.

The fog committee continued its study of fog conditions in the Cut. In this connection special lights were installed for experimental purposes.

#### ACCIDENTS TO SHIPPING

The board of local inspectors conducted investigations and submitted reports on 28 accidents of a marine nature occurring to vessels either in transit or in the terminal ports of the Canal, as compared with the same number for last year and 34 the year before. Classification of the 28 accidents shows the following: Struck docks, 3; struck lock walls, 9; struck oil-plant platform, 1; hit submerged object, 2; hit buoys, 2; line fouled propeller, 3; bits and chocks broken, 2; collision and sinking, 1; collision, 2, of which one was adjudged to have occurred outside of Canal Zone waters; tug dented side coming alongside, 1; damage to submerged cable, 1; and grounded, 1.

In addition to the above, two investigations were held on account of accidents caused by Panama Canal launches, one involving a launch which caught fire and was totally destroyed, the other involving damage to a landing by a launch.

On October 5, 1935, the Panama Canal salvage tug U. S. S. *Favorite* proceeded to sea off Cristobal to latitude 10°43' N., longitude 79°33' W., and picked up the disabled S. S. *Sagebrush*, which it towed to Cristobal. The U. S. S. *Favorite* assisted in salvage operations on the S. S. *Nuevo Panama*, which went ashore at Paitilla Point, Panama Bay, during October 1935. On October 28, 1935, the U. S. S. *Favorite* was dispatched to the assistance of the S. S. *Cuzco*, ashore on Lampa Shoal, on the coast of San Salvador, and assisted in refloating the stranded vessel. On April 4, 1936, the U. S. S. *Favorite* proceeded to latitude 10°42' N., longitude 80°30' W., picking up the disabled S. S. *Point Salinas* and towing that vessel to Cristobal.

#### METEOROLOGY—HYDROLOGY—SEISMOLOGY

*Precipitation.*—Rainfall for the calendar year 1935 averaged, in general, above normal. March was the month of least rainfall and November of greatest rainfall. Annual totals for Canal Zone and vicinity for the calendar year 1935 ranged from 82.21 inches at Balboa to 204.23 inches at Porto Bello. The maximum precipitation

recorded in 24 consecutive hours in the Canal Zone and vicinity during the year was 10.25 inches at Salamanca on November 17 and 18. The average precipitation in the Pacific section was 86.12 inches; in the central section, 132.09 inches; and in the Atlantic section, 179.80 inches.

*Air temperatures.*—The maximum and minimum temperatures of years of record at various stations, revised to June 30, 1936, and the annual average temperature for the years of record, are shown in the tabulation following:

Station	Maximum		Minimum		Annual average	Years of record
	° F.	Date	° F.	Date		
Balboa Heights.....	97	Apr. 7, 1912	63	Jan. 27, 1910	78.7	30
Madden Dam.....	98	Apr. 13, 1920	59	{Feb. 4, 1924 Jan. 30, 1929 }	78.4	25
Gatun.....	95	{May 4, 1933 May 21, 1925 }	66	Aug. 7, 1912	<sup>1</sup> 80.3	25
Cristobal.....	95	{Oct. 18, 1924 May 26, 1925 }	66	Dec. 3, 1909	80.0	28

<sup>1</sup> Mean of maximum and minimum temperatures.

The average air temperature for the calendar year 1935 was in general below normal. April was the warmest month and November the coolest.

*Winds and humidity.*—The annual wind movement in the Canal Zone for the calendar year 1935 was in general below normal. March was the month of greatest average wind velocity and June the month of the lowest. The mean relative humidity of the atmosphere for the calendar year 1935 was 84 percent on the Pacific coast and 82 percent on the Atlantic. March was the month of least average relative humidity and November the greatest.

*Tides.*—For the calendar year 1935 the maximum high tide at Balboa, 11.5 feet above mean sea level, occurred on September 15; the maximum low tide, 11.2 feet below mean sea level, occurred on February 6. The greatest daily range, 21.0 feet, occurred on February 6 and September 15. At Cristobal the maximum high tide, plus 1.52 feet, occurred on December 7; the maximum low tide, minus 0.94 foot, occurred on April 8, and the greatest daily range, 1.86 feet, occurred on December 10.

*Seismology.*—Two hundred and forty-five seismic disturbances were recorded at Balboa Heights seismological station during the calendar year 1935. Fifty-five of these disturbances were of comparatively close origin, about 250 miles distant, nine of which were generally felt, principally in the Province of Chiriqui, Republic of Panama. Thirteen were of distant origin, and 177 were so slight that no estimate could be made of their epicenter. A rather severe

earthquake was registered on the morning of May 6, 1936, the first preliminary tremors arriving at 3:21:15 a. m., 75th Meridian time; although the main phases of the quake were indistinguishable due to the rapidity of the motion, the record indicates that the epicenter was from 25 to 50 miles from Balboa and probably in a southerly direction. This shock alarmed many people in the Republic of Panama and in the Canal Zone, being accompanied by a loud roar or rumble, a phenomenon common to most earthquakes in the vicinity of their epicenter. With the exception of slight cracks in structures and minor loosening of tiles, no damage was reported. Quakes were also felt on February 26 and April 23, 1936, both in the Canal Zone and Republic of Panama, and on November 30, 1935, a seismic disturbance was recorded and generally felt, the instruments indicating its location as approximately 70 miles distant.

#### VISIT OF UNITED STATES FLEET

Between May 8 and May 26, 1936, the United States Fleet visited the port of Balboa during the annual spring tactical exercises. Ninety-five Navy vessels were berthed in Balboa inner harbor, comprising 2 battleships, 3 cruisers, 5 tenders, 1 hospital ship, 51 destroyers, 17 submarines, 16 mine sweepers and tugs. The remaining large vessels of the fleet anchored in the open roadstead off Balboa outer harbor. The aircraft carriers *Ranger* and *Langley* and destroyers were fueled at Balboa. One sortie of the fleet from the inner harbor was accomplished during nighttime without incident. During the fleet's visit 48 of the vessels transited the Canal for short visits at Cristobal. Shore visits totaling 118,750 were made by Navy personnel during the fleet's stay on the Pacific side.

#### RULES AND REGULATIONS

A board was appointed to study and revise the rules and regulations for the navigation of the Panama Canal and adjacent waters and to make a reprint of Rules and Regulations Governing Navigation of the Panama Canal and Adjacent Waters, and Chapter XII. Vessel Inspection Service. This study was begun by the board and their recommendations will be submitted early in the coming fiscal year. A study of methods of handling explosives and dangerous cargoes was completed and rules based thereon will be incorporated in the revised rules and regulations, which, insofar as is practicable, will be based upon existing United States rules. The Pilot's Handbook, issued in 1930, was revised and reprinted in a 1935 edition, constituting an up-to-date manual of information for both Canal and harbor pilots.

## SECTION II

### BUSINESS OPERATIONS

The business enterprises carried forward by the Canal and by the Panama Railroad Co. embrace a number of activities which in the United States would normally be carried on by private initiative. These activities have been developed either to meet the needs and demands of shipping passing through the Canal, or to meet the needs of the organization and its force of employees. The business enterprises include those sections of the Canal and Railroad organizations which are engaged in the supplying of fuel, provisions, ship chandlery, and repairs to vessels; the sale of food, clothing, and other essentials to Canal and Railroad employees; the handling of cargo and allied operations; and the operation and management of the Panama Railroad and of the steamship line operating between New York and the Isthmus.

The Canal and the railroad organizations are separate but in administration and performance of work they are united and under the central control of the Governor of the Panama Canal, who is also president of the Panama Railroad Co.

#### PANAMA CANAL BUSINESS OPERATIONS

The gross profits, or excess of revenue over expenses, for the business activities of the Panama Canal amounted to \$920,185.23 for the year, as compared with \$1,021,216.61 for the fiscal year 1935. This is a decrease of approximately 10 percent. However, salary reductions due to economy acts amounted to \$144,851.74 in 1935, whereas the acts were not effective in 1936. Without the Economy Act savings the gross profit in 1935 would have been only \$876,364.87. Operations of two units, the electric light and power system and the fuel oil plants, produced over half of the profits during the past fiscal year. Detailed results of the various divisions are shown in table 26, section V.

Business operations of the Panama Canal are conducted separately from operating activities pertaining directly to the transiting of vessels, and government of the Canal Zone. The annual appropriation acts for the Panama Canal authorize the use of appropriated funds for the conduct of auxiliary business activities, provided that

funds so advanced are recovered through earnings, and with the further proviso that any net profit derived from such business activities be covered annually into the United States Treasury.

In the accounting of profit and losses of the business activities there is no actual interest charge on the money invested in these plants and their equipment. This investment totaled \$29,067,383.76 at the beginning of the fiscal year and \$30,427,202.61 at the end (table 4, sec. V). To establish a criterion for profit, a capital charge has been calculated, based on 3 percent of the capital investment (with minor variations such as 2 percent on public works in Panama and Colon, to accord with existing contracts and 1½ percent on the shops at Balboa, which for reasons of national defense were made somewhat more extensive than the needs of commerce require) plus relatively slight amounts representing variations in supplies on hand. This theoretical capital charge for the fiscal year 1936 was \$832,266.79 (table 20, sec. V). The profits of \$920,185.23 exceeded this amount by \$87,918.44.

Based on the figure of \$29,067,383.76 representing fixed property and equipment alone at the beginning of the year, the profits counted at \$920,185.23 showed a return of 3.17 percent.

#### MECHANICAL DIVISION

The mechanical division has jurisdiction over the mechanical and marine shops, drydocks, car shops, and roundhouses at Balboa and Cristobal; the design, construction, and major alteration of hulls and machinery of propelled and nonpropelled floating equipment of the Panama Canal, Panama Railroad, and commercial business, except the electrical work; the design and technical matters of the railway rolling stock and of propelled and nonpropelled floating craft involving naval architectural subjects for the hulls and marine engineering subjects for the operating machinery; repairs to all equipment, floating or otherwise, of the Canal, railroad, and commercial business requiring mechanical or marine shop or drydock facilities, except electrical and automotive repair; the railway-car inspection including repair of rolling stock, hostling, and manning the railway wrecking outfit; the maintenance of inspection services including tests and repairs (except electrical and marine boilers) for Canal and railroad, for passenger and freight elevators, for weighing scales and measuring devices (scales, pumps, meters), and for clocks, typewriters, and similar instruments; manufacture and distribution of compressed air, acetylene, oxygen, and hydrogen; and the fabrication of such machinery or equipment, floating or otherwise, spare parts, etc., as in the opinion of the Governor may be more economically or expediently made on the Canal Zone than purchased elsewhere.

## GROSS REVENUE

The gross revenue for the fiscal year 1936 amounted to \$3,133,218. This amount was subdivided as follows:

Source	Total	Percent of total
Panama Canal.....	\$1,686,909	53.84
Panama R. R.....	412,635	13.17
Other departments, U. S. Government.....	389,846	12.44
Outside interests.....	643,828	20.55

Of the above gross revenue the purely marine work which included new construction of vessels for the Canal, overhaul of vessels of the Canal and other departments of the Government, as well as all commercial work, amounted to \$2,055,018, constituting 65.59 percent of the gross revenue of this division. The marine work therefore was greater than that of the 3 previous fiscal years, which were respectively 60.34 percent, 64.27 percent, and 60.55 percent of the gross revenues of those years.

Referring to the above tabulation of the gross revenue, it is also to be noted that the work for other Government departments, which was 12.44 percent of the gross revenue, has decreased from 16.75 percent for the previous fiscal year, due largely to the sending to the States for decommissioning of the division of submarines based at Coco Solo. The revenue to be derived from the Navy, however, will increase during the forthcoming fiscal year, as the Navy Department has assigned to Coco Solo another division of submarines of the *S-42* class.

It is encouraging to know that the work performed for other interests this fiscal year amounted to 20.55 percent of the gross revenue whereas for the previous year that source of income was only 14.53 percent of the gross revenue.

## MARINE WORK

There has been a constant demand for the use of the drydocks at both plants and a total of 141 vessels were placed in the drydocks during the fiscal year. However, it is to be noted that commercial shipping diverts to the Canal only urgent repairs necessary for clearance of the vessels from Canal waters. In other words, with the exception of a few coastal vessels, shipping concerns do not have their vessels given periodic overhauls at the mechanical division shops. Referring to the drydocks, the *S. S. Maracay* entered the Mount Hope drydock with only 4½-inch clearance between the side of the vessel and the drydock entrance, which is indicative of the demand being made on the small drydock at Mount Hope for han-

dling vessels of very large dimensions. At Balboa the principal dry-docking was performed on the S. S. *Vancouver* during April for temporary repair to the damaged bottom of that vessel, amounting to \$68,000. At Cristobal the principal drydock job was performed on the S. S. *Santa Monica* for extensive repair of the damaged bottom at a cost of approximately \$34,000. A second bottom job was performed at Mount Hope on the S. S. *Manizales*, which vessel had been damaged by grounding.

Other than the naval work which is enumerated below, the principal overhaul job at the Mount Hope shops was performed on the S. S. *Trojan Star*, which required boiler repair to its entire boiler plant, and since the vessel had a large cargo of fruit on board the shops worked continuously day and night. The important ship repair at the Balboa shops included the M. S. C. O. *Stillman*, S. S. *Cuzco*, S. S. *Mantillo*, S. S. *West Ivis*, S. S. *Iocoma*, S. S. *Polarine*, S. S. *K. R. Kingsbury*, S. S. *Andino*, S. S. *Fordsdale*, M. S. *Potter*, S. S. *Centralia*, and the yacht *Caroline*.

*Repair of naval vessels.*—At the Balboa plant the following work was performed on vessels of the United States Navy: The bow of the U. S. S. *Minneapolis*, which was damaged by collision during the fleet concentration in Canal waters, was rebuilt at a cost of about \$10,000. The vessels of the Special Service Squadron docked and given voyage repairs include the *Memphis*, *Manley*, *Fairfax*, *Tattnal*, *J. Fred Talbott*; and voyage repairs were performed on the *Trenton*, *Claxton*, and *Taylor*. District craft docked and given general overhauls included the *Hannibal*, YP-41, and YP-42.

At the Cristobal plant annual docking and overhaul were performed on submarines S-12 and S-13; the *Lapwing*, *Mallard*, *Teal*, *Woodcock*; houseboat No. 1; drag boats Nos. 7 and 8; patrol boats YP-41 and YP-42; and steel barges YPK-4, YPK-5, YW-11, YSD-8, YC-472, YO-11, and YF-225.

*Repairs to vessels of United States Army.*—At Balboa shops: Army transport *St. Mihiel* was drydocked for installation of a new rudder; the mine planter *H. C. Schumm* was drydocked and given a general overhaul; voyage repairs were performed for Army transport *Chateau Thierry*; drill boat L-55 was drydocked and given an overhaul; overhauls were performed on the drill boat L-41, inspection launch Q-2, and mine planter *Graham*.

At the Cristobal shops: The M. S. L. *Morgan Lewis* and launches L-53 and L-41 were drydocked and overhauled.

*Repairs to other vessels of United States Government.*—At the Cristobal shops the lighthouse tender *Acacia*, stationed at Puerto Rico, was drydocked and given a general overhaul.

*Repairs to vessels of foreign governments.*—At the Balboa shops, drydocking and overhaul were performed on the Peruvian cruisers



*Coronel Bolognesi*, *Almirante Guise*, *Almirante Villar*, gunboat *Parinas* and submarines *R-1*, *R-2*, *R-3*, and *R-4*. The merchant ships *Mantaro* and *Apurimac*, controlled by the Peruvian Government, were overhauled and the *Mantaro* was placed in drydock.

At the Cristobal shops the Colombian gunboat *Bastidas* and the S. S. *Cabinas* and the Peruvian merchant ship *Perene* were given general overhauls. Repairs were performed on the Mexican gunboat *Mosquera*.

*Marine construction and repair of vessels of Panama Canal departments.*—The two Diesel-electric tugboats, the *Arraijan* and *Alhajuela*, designed and constructed by this division at an estimated cost of \$570,671, were launched on August 1, 1935, and were fully completed and turned over to the marine division during the first week of June 1936. These vessels are sister ships, of steel construction, 110 feet 6 inches in length, and have a normal operating shaft horsepower of 750. The machinery for the two vessels cost approximately \$260,000. During the trials the vessels met all their design requirements and they are now in commission operating at the Balboa terminal.

During April the mechanical division prepared the design and specifications for purchasing machinery for a new Diesel-electric tug to be built for the dredging division, to be somewhat similar to the *Chagres* and to cost approximately \$375,000, of which \$170,000 will probably be required for the machinery. This vessel is to be known as the U. S. *Gatun*, is of steel construction, 125 feet 7 inches in length, and will be capable of operating at 900 shaft horsepower. The specifications for purchase of the machinery were sent during June to the Washington office. The steel for the hull of the vessel arrived in the yard during July 1936 and the fabrication of the hull will commence.

The division designed and is building a 1,000-yard dump steel scow designated as *No. 126* for the dredging division at an estimated cost of \$130,000. Fabrication of this barge abreast the Balboa drydock was commenced during the latter part of the fiscal year and is scheduled for launching and completion during October 1936.

The construction of a new towing locomotive for the locks division estimated to cost \$35,200 which was begun in the previous fiscal year was continued throughout this fiscal year.

The construction of two 40-foot motor launches of the *Snook* type was commenced at the close of the fiscal year, one launch to be equipped with a Diesel engine designated as NAVY TYPE DB and the other may be equipped with a Diesel engine purchased from the Buda Co.

Extensive repairs were performed on the dredging division barges 48, 50, 119, 131, 134, 135, 139, and 194 and the dredges *Las Cruces*,

*Gamboa, Paraiso, and Cascadas* were drydocked and given extensive overhauls.

*For the marine division.*—A new low pressure cylinder was cast for the main engine of the *Gorgona* and an overhaul was performed on the tug *Favorite*. The following work was done on tugs and launches: The tugs *Tavernilla* and *Cocoli* and the launches *Trogon*, *Cone*, *Pelican*, *Egret*, *Jessop*, *Pato Real*, *Owl*, *Cotinga*, *Cormorant*, *Swallow*, and *Toucan* were given running repairs.

The foundry made in one casting a cutterhead for the dredge *Las Cruces* which required approximately 20,000 pounds of molten metal and is the largest single casting made to date by that foundry. A previous cutterhead of about the same dimensions had been made in two parts and subsequently welded together before it was determined that the foundry could make such a casting as a unit.

#### WORK OTHER THAN MARINE WORK

Design specifications were prepared by this division for the purchase of a new motor car for carrying 42 passengers for use on the Panama Railroad and also for the purchase of six center-dump all-steel cars. The average amount of heavy and light repairs was performed on the locomotives for the railroad and in addition the Balboa roundhouse overhauled locomotives belonging to the local United States Army as well as those assigned to the several departments of the Canal for their respective use. Three second-class passenger cars of the Panama Railroad were fitted with cross-seats for use daily for second-class passengers.

In preparation for the Pacific Locks overhaul about \$50,000 of fabricated parts were handled in the machine shops. Incident to the erection of buildings and shops by contractors, the mechanical division wood shops fabricated a very large percentage of the sashes, doors, and wood fittings, particularly for those buildings being erected at the Gamboa townsite. The division fabricated and installed the steel structure for widening the Gamboa Bridge for automobile traffic at an approximate cost of \$30,000. The steel structure for the new oxy-acetylene plant to be erected at Balboa was fabricated by the Balboa shops, as well as the steel structure for the new rigger shop.

The usual amount of car reconditioning for the rolling stock of the railroad was performed during the fiscal year under an allotment of \$180,000.

#### PLANT IMPROVEMENTS

In compliance with the instructions of the Navy Department the mechanical division fabricated 192 cast-iron block assemblies for the Balboa drydock at a cost of \$50,000 to permit the docking of capital vessels of the United States Navy on cast-iron blocks throughout.

The 35-ton traveling crane for use at the Mount Hope drydock, which was designed and constructed by the mechanical division, was completed this fiscal year under an allotment of \$88,500. This crane has a lifting capacity of 35 tons. The fabricated crane was shipped from the Balboa shops in a knocked-down condition by the 250-ton floating crane and was assembled by that crane in the Mount Hope drydock.

In view of the fact that the present oxy-acetylene plant has inadequate capacity and is located in a very hazardous place as regards naked fires, and as its equipment is not fully protected against explosion and fire, the mechanical division redesigned that plant and secured funds to rebuild and modernize the plant, locating it in the vicinity of the Balboa drydock pumphouse. The new equipment for this plant will cost \$128,775. The steel for the new building has been fabricated and will be erected by a contractor during the coming fiscal year, at an approximate cost of \$41,000 for the building.

Both the Cristobal and Balboa industrial areas were enclosed with a heavy cyclone steel fence for protection. Traffic into and from each plant is via one gate under the control of a gold watchman.

As there was no street lighting at the Mount Hope plant, a modern, adequate street-lighting system was installed during this fiscal year, and five additional street lights were installed at the Balboa plant.

The old dilapidated wooden block stowage shed at the Balboa drydock was demolished and during the coming fiscal year will be replaced with a light wooden construction shed to cost about \$8,000.

#### PROSPECTIVE TREND OF BUSINESS

While the gross revenue this fiscal year, \$3,133,219, exceeds that of last fiscal year by \$343,588, the volume of business has shown no such increase and the greater portion of the \$343,588 was necessary to pay the increased wage under the 40-hour-week law.

During the fiscal year the division has had a large revenue from major projects being fabricated for the Canal, such as the building simultaneously of two Diesel-electric tugs, but it is estimated that the volume of projects will decrease hereafter.

The Mount Hope plant is sustained solely by naval work on submarines at Coco Solo and intermittent commercial work. The Balboa shops have little naval work, insufficient commercial work, and are sustained principally by large projects being fabricated for the Canal and railroad. Consequently curtailment of the projects will fall heavily on the Balboa shops.

There is no indication that commercial shipping work will increase and there is some doubt that the past volume of work will be maintained.

## FINANCIAL

The origin and class of work done by the mechanical division in the fiscal year 1936 and in the previous fiscal year are shown in the following table:

*Gross revenue—class and source of*

	Fiscal year	
	1935	1936
Class:		
Marine.....	\$1,683,362	\$2,055,018
Railroad.....	370,208	395,972
Fabricated stock.....	247,239	248,951
Sundries.....	488,821	433,277
Total.....	2,789,630	3,133,218
Origin:		
Panama Canal.....	1,539,242	1,686,909
Panama Railroad.....	377,618	412,635
Other United States departments.....	467,217	389,846
Outside interests.....	405,553	643,828
Total.....	2,789,630	3,133,218

The total expenditure of the division was \$3,066,564 and for the previous fiscal year was \$2,553,322, an increase of \$513,242 over the previous year. The \$513,242 was disbursed as follows: \$332,462 for materials, \$137,756 for labor, and \$43,024 for miscellaneous items. The flat rate activities which include the drydocks, foundries, cranes, automobiles, etc., earned profits of \$103,420 and the Canal expense surcharge gave an added profit of \$85,700. The net earnings, after deducting \$12,653 for replacements, were \$172,143.

There was no revision of wages this year and the machine tool rates were continued without revision.

## ELECTRICAL DIVISION

The principal activities of the electrical division are the operating and maintaining of the hydroelectric and Diesel-electric power plants, substations, transmission lines, and power distribution systems; the operation and maintenance of telephone, telegraph, electric clock, fire alarm, and railway signal systems; the operation and maintenance of Gatun spillway and Madden Dam; and the installation and maintenance of such electrical equipment as is required by other divisions of the Canal or other departments of the Government, and by such commercial and other vessels as may require electrical work performed while transiting or calling at the Canal. The total expenditure of the electrical division for the year was \$1,420,512.83, which included \$533,222.43 for maintenance and operation of the power system; \$736,711.60 for construction and maintenance of electric work section; \$114,762.26 for the maintenance and

operation of the telephone section; and \$35,816.54 for the maintenance and operation of the railway-signal section.

For the fiscal year the electric light and power system continued to earn not only the required 3 percent return on invested capital, but a small excess or surplus over this amount. These profits were earned despite the fact that expenses of the system were appreciably increased through the addition of reserve and interest charges incident to the taking of the Madden power station costs into the capitalization of the system, and were made possible only by the reduction in system losses and operating expenses and by added load to the system. The process of reducing system losses and operating expenses has been carried on over a period of years, commencing in 1928 when parallel operation of the trans-Isthmian transmission line was effected and ending with the complete removal of the old manually-operated Gatun substation from the system during June 1934. Prior to the removal of the Gatun substation from the system, both the Balboa and Cristobal substations had been converted from manual to remote operation. These substation changes alone effect an annual saving of some \$60,000 in power system operating expenses. Added load to the system has been brought about almost exclusively through adopting electric heating equipment for Canal quarters and the encouragement of the Army and Navy to do likewise. This policy was adopted by the Canal in 1930, and the Army is now beginning to adopt electric heating equipment. Further data on the operations of the electric light and power system were presented in section I under the heading "power for Canal operations." Following is a brief discussion of the electrical installation and repair work carried on during the past year.

The relocation of the underground electrical distribution system along the shore site of Dock 15, Balboa, was approximately 90 percent completed at the close of the fiscal year. This work involved the laying of ductline and construction of two distribution houses, in each of which a 50-kilovolt ampere transformer and three 37½-kilovolt ampere power transformers were installed. Power cable was also run to the Balboa shops and a temporary transformer house built at the rear of Dock 15 to provide electric service to the 2,300-volt pump motors operated in connection with the construction of Dock 15.

Electric service was provided to the United States Navy's new depot on the west side of the Canal, involving the construction of slightly more than 2 miles of overhead pole line consisting of three copper transmission wires and ground wire, connecting with the existing 2,300-volt line on the west side. At the depot this electric service was carried to the Navy's distribution house, passing under

Thatcher Highway through 180 feet of buried armored cable. Telephone service was provided to the depot by trenching, burying, and splicing 11,200 feet of armored telephone cable along Thatcher Highway, connecting with the existing Panama Canal system near the west ferry approach.

An underground distribution system was constructed during the year for the new town site at Gamboa, including construction of three transformer houses and three distribution houses and the installation therein of transformers and other necessary electrical equipment, for supplying the town site with light, power, and telephone service. This new distribution system was also extended to serve the new dock under construction for use of the dredging division. Construction of an underground distribution system for the new quarters area at Gatun was practically completed during the fiscal year, providing electric power, lighting, and telephone service; and the street lighting system for the Gatun town site was considerably extended. At France Field the construction of a new 11,000/2,200-volt outdoor substation was completed during the early part of the fiscal year, replacing the old station which was considered entirely inadequate for present requirements and unsafe for operating and maintenance personnel involved. To improve the reliability and capacity of the electric service at the Army post of Fort Sherman, an additional feeder was begun, a new transformer substation was designed, specifications completed, and right-of-way cleared during the year. Three transformers were installed to provide duplicate service to the fleet air base at Coco Solo.

A total of 393 jobs was completed in the marine electric shops for Government, commercial, and other vessels calling at or transiting the Canal, 178 of which were handled at the Pacific terminal and 215 at the Atlantic terminal. Among the more important of these jobs were the installation of motors in each of the machine rooms at the two ferry ramps at Balboa, together with the necessary wiring of the ferryboats to provide direct-current service for the shore motors for emergency power to operate the ferry ramps when the regular power service is interrupted; the installation of all electrical apparatus for both power and light on the Diesel-electric tugs *Arraijan* and *Alhajuela* which were constructed in the Balboa shops; complete overhaul of main switchboard of the dredge *Las Cruces*; general repairs to electrical equipment aboard the Panama Canal tugs *Trinidad*, *Tavernilla*, *Cocoli*, *Favorite*, and to crane barge *Ajax*, U. S. lighthouse tender *Acacia*, and the S. S. *Cristobal* of the Panama Railroad Steamship Line. General overhaul was also made of the United States Navy submarines *S-10*, *S-11*, *S-12*, and *S-13*, as well as extensive alterations and repairs to electrical equipment aboard the United States Navy ships *Hannibal*, *Teal*,

*Nokomis*, *Mallard*, *Woodcock*, and *Lapwing*, and the United States Army mine planters *General G. W. Getty* and *General Morgan Lewis*.

Other electrical work performed included the conversion of the old restaurant building at Balboa into the new Balboa police station; extension of the street-lighting system at Balboa shops; transfer of motor-generator set and coupon-counting machines from the Administration Building at Balboa Heights to their new location in Ancon; removal and relocation of the street-lighting system of Fourth of July Avenue, made necessary by the widening of that thoroughfare; dismantling and removal of approximately 8 miles of overhead pole line between Alhajuela and Salamanca, originally installed for the flood-warning system, now unnecessary since these two points have been connected by submarine cables laid on the bed of Madden Lake as reported in previous year's report; the providing of electric service to the new Navy radio station at Summit, as well as to the lighthouse subdivision at Gamboa.

Installation of electric ranges and water heaters in Panama Canal quarters was continued throughout the year, and at the end of the year there were 141 of the two-burner type, 1,889 of the four-burner type, and 12 of the six-burner type.

#### PURCHASES AND INSPECTIONS IN THE UNITED STATES

The purchase of general supplies in the United States for the use of the Panama Canal on the Isthmus is made by the Washington office except for certain purchases made by assistant purchasing agents at New York and San Francisco, and except that the Panama Canal, medical section, New York general depot, United States Army, Brooklyn, N. Y., purchases the principal medical and hospital supplies used on the Isthmus. In addition, the assistant purchasing agents at New York and San Francisco and the assistant freight traffic manager of the United Fruit Co. have acted as receiving and forwarding agents for material and supplies delivered at and through their respective ports for transshipment to the Isthmus.

The preliminary inspection of materials in the United States covering purchases the delivery of which is required on the Isthmus (which constitutes the large majority of purchases) and final inspection of materials delivered in the United States are made by the force of inspectors in the field under the supervision of the inspecting engineer at Washington, assisted by the officers of the Corps of Engineers, United States Army; the Bureau of Standards; the Bureau of Mines; the Bureau of Chemistry, Department of Agriculture; the Medical Department, United States Army; the Bureau of

Construction and Repair and the Bureau of Engineering, Navy Department.

The total number of orders placed in the Washington office during the fiscal year was 8,267, being an increase of 163 as compared with the fiscal year 1935. The number of orders placed during the fiscal year 1936 was the largest placed during any fiscal year since 1920, and exceeds the number of orders placed during any fiscal year since 1904 (when construction work was begun), with the exception of the fiscal years 1916, 1917, and 1920.

The total value of the orders placed in the United States in the fiscal year 1936 was \$4,443,253.62, as compared with \$4,285,350.58 for the fiscal year 1935, an increase of \$157,903.04. The Washington office orders during 1936 amounted to \$4,344,428.50, as compared with \$4,215,332.12 for the prior fiscal year. Orders placed by the assisting purchasing agents at New York and New Orleans, and the medical section of the New York General Depot amounted to \$98,825.12, as compared with \$70,018.46 for the prior fiscal year. The total purchases by the Washington office since the year 1904 amount to \$229,020,041.21. The other agencies mentioned have purchased since 1904 supplies to the value of \$4,422,443.10, making a grand total of all purchases of \$233,442,484.31.

During the fiscal year 1936, there were prepared 11,503 disbursement vouchers amounting to \$4,925,838.59, and 314 collection vouchers amounting to \$159,357.91. These vouchers pertained primarily to the purchase of supplies. In addition to the collection vouchers, 25 collections aggregating \$585.86 were made by the General Accounting Office, making the total amount actually collected \$159,632.29, on 321 accounts. Cash discounts taken during the fiscal year amounted to \$35,977.90, an increase of \$5,590.15 from the preceding year. Except for the fiscal year 1930, this is the largest amount of discounts taken since the fiscal year 1927.

Mr. Arthur L. Flint, the chief of the Washington office and general purchasing officer of the Panama Canal, died on May 18, 1936, while in New York attending a meeting of the board of directors of the Panama Railroad Co. Mr. Flint had served the Washington office continuously since April 25, 1905. His loyalty and devotion to the Panama Canal were sincere and traditional, and his death was a distinct shock to those members of the Canal organization with whom he came in contact.

Mr. Emil E. Weise, assistant to the chief, died on February 8, 1936. Like Mr. Flint, Mr. Weise had been connected with the Washington office since 1905, and his loss is being keenly felt.

Mr. Floyd B. Heimer was appointed assistant to the chief of office to succeed Mr. Weise, and since the death of Mr. Flint has been acting as chief of the Washington office.



Upon the transfer of Mr. H. A. A. Smith, assistant comptroller, to the Isthmus as comptroller of the Panama Canal, Mr. Arnold Bruckner was appointed assistant comptroller in the Washington office, he having served for several months previous as assistant to the comptroller on the Isthmus.

### SHIP CHANDLERY AND OTHER STOREHOUSE SUPPLIES

During 1936 the operation of the storehouse was continued under the same general policy as in previous years. On June 30, 1936, the book value of stock on hand at all storehouses was \$4,200,154.16 as compared with \$4,229,033.79 on June 30, 1935. The total value of all materials received on requisition from the United States was \$4,658,930.06. Local purchases were made totaling \$341,184.81. Scrap and obsolete stock remaining on hand at the end of the year totaled \$31,503.51. During the year 134 net tons of American scrap iron were sold in the local market, and 1,129 net tons sold for export.

The general storehouse at Balboa (including the medical storehouse) and the branch storehouses at Cristobal and Paraiso handled a total of 133,219 requisitions and foreman orders during the year. Material and supplies sold to steamships, employees, and others aggregated \$784,201.62. The sales to steamships amounted to \$46,183.90, involving 1,830 sales, a decrease from the previous year of \$2,546.43.

Native hardwood lumber operations were continued in the Canal Zone, and 198,174 board feet of logs at \$35 per thousand board feet were purchased. Cement consumption for the year amounted to 87,602 barrels.

For the year's operations, revenues exceeded expenditures by \$84,939.20 (see table 26, sec. V).

### OBSOLETE AND UNSERVICEABLE PROPERTY AND EQUIPMENT

During the year disposition was made by sale, or by destruction where the items had no money value, of obsolete or unserviceable property and equipment which had an original value of \$559,988.20. Replacements were made as necessary.

### FUEL OIL, DIESEL OIL, GASOLINE, AND KEROSENE

*Fuel and Diesel oil.*—All deliveries to and from tanks, for private companies as well as for the Panama Canal and the United States Navy, are handled through pipe lines and pumping plants of the Panama Canal. The total fuel and Diesel oil handled by the Balboa and Mount Hope plants, including both receipts and issues, aggre-

gated 10,068,542 barrels, as compared to 9,713,542 for the preceding year. The operations are shown in detail in the following tabulation:

	Balboa	Mt. Hope	Total
	<i>Barrels</i>	<i>Barrels</i>	<i>Barrels</i>
Received by the Panama Canal.....	159,584.69	264,738.64	424,323.33
Used by the Panama Canal.....	172,100.51	252,571.74	424,672.25
Pumped for individuals and companies.....	4,312,309.38	4,860,408.67	9,172,718.05
Sold by the Panama Canal.....	3,020.98	3,923.70	6,944.68
Miscellaneous transfers.....	31,814.56	8,069.63	39,884.19
Total.....	4,678,830.12	5,389,712.38	10,068,542.50

The number of ships discharging or receiving fuel oil (including Diesel oil) during the year totaled 1,748, of which 74 were Panama Canal craft.

*Gasoline and kerosene.*—Bulk gasoline and kerosene received on the Isthmus during the year totaled 4,055,143 and 970,001 gallons, respectively.

#### BUILDING CONSTRUCTION AND MAINTENANCE

The principal projects of building construction and repair work completed during the year consisted of new roof, ventilators, and skylight on dock no. 9 (annex), Cristobal; raising and repairing of 23 silver family quarters at Camp Bierd, Cristobal; renewing roof on dock no. 7, Cristobal; renewing roof on Cristobal retail commissary; construction of truck shed and repair shop, etc., for motor transportation division at Cristobal; construction of extension and renewing roof on local freight house, Panama City; burglar-proofing of gold family quarters, New Cristobal and Ancon-Balboa; conversion of old restaurant building into police station, Balboa; renewing roof on commissary warehouse, Mount Hope; and construction of addition to commissary building, Gamboa.

Work on the following projects is now under way and will be completed during the fiscal years 1936-7: Conversion of old restaurant building into clubhouse, Cristobal; addition to present ward building, Palo Seco; demolition of 23 old buildings, Gatun; paint exterior of 105 gold quarters, Ancon, 52 gold quarters, Pedro Miguel, and 35 silver family quarters, Red Tank; manufacturing mill work for building program, Gamboa; interior painting of 104 gold quarters, Ancon-Balboa; construction of new police and customs booth, Balboa; and erecting hoods between first and second floors of 47 four-family gold quarters, Balboa.

#### TERMITES

The work of prevention of destruction to frame buildings by termites continued during the year. Periodical inspections and repairing

of the metal plates where damaged are necessary precautions against termites.

### QUARTERS FOR EMPLOYEES

*Gold employees.*—The family quarters situation is more acute than in the previous year due not only to several new appointments but also to a greater proportion of married employees. At Gatun there were demolished during the year 24 old frame houses containing 104 family apartments, and during the same period there were constructed 34 houses containing 57 apartments.

*Silver Employees.*—The operation of silver quarters continued on the same basis as in the previous year. As stated in the annual report for 1935, it became necessary to make a slight increase in rental rates to provide adequate maintenance funds. Accordingly, a new rental schedule was put into effect July 1, 1935, with the result that it has adequately provided sufficient funds to allow reasonable maintenance, but insufficient to set up a proper replacement reserve. Consequently, revenue paid maintenance work is being carried on through the year and will continue. During the fiscal year a number of silver family quarters have been equipped with electric meters, and the occupants are now being charged for the actual current consumed, plus cost of public lights in hallways which are charged at a flat rate of 20 cents per apartment. It is intended to continue the installation of meters in the better class of silver quarters through the Canal Zone as funds become available.

The demand for family quarters from employees on the silver roll is still far in excess of the supply. Over 50 percent of the silver employees reside in the cities of Colon and Panama where rental rates are considerably higher than charged by the Canal for Government quarters in the Canal Zone. On June 30, 1936, there were on file for Canal Zone silver quarters 1,120 applications.

### *Replacement of Quarters for American Employees*

About 10 years ago cost records, etc., indicated that the cost of maintaining the oldest frame quarters for American employees had reached the point where replacement was the most economical procedure. Some of these old quarters were built by the French Canal Co. and by the Panama Railroad Co. before the United States acquired the Canal Zone in 1904. There were also in use a large number of construction camp type of frame houses built during the first years of American operations and large numbers of similar houses built prior to 1915. Some of these were reerected houses which had been moved from towns that were abandoned upon completion of construction work. It was realized that their replacement would

require an extensive construction program over a period of years. The matter was placed before Congress and the first appropriation for replacement of quarters for American employees was made for the fiscal year ended June 30, 1927.

The first types of quarters designed and built for the permanent force were of concrete. On account of the large first cost of concrete buildings, designs were resorted to of concrete columns and first-floor beams with wood frame structure above. After experience in the construction and maintenance of various types of houses, and after giving consideration to original cost, upkeep, etc., the wooden structures supported on concrete beams have been adopted as standard, and are preferred by a majority of the employees. Concrete types are being retained for bachelors' quarters.

It is believed that the present scale of rental charges will be sufficient to cover depreciation as well as all other costs of maintenance and operation once the old frame buildings are replaced by the newer types.

The following is a summary of the new quarters constructed and of the old quarters remaining to be replaced after the current fiscal year:

## Number of apartments for American employees' quarters

	Cristobal, New Cristobal, Colon Beach		Gatun		Gamboa		Pedro Miguel		Ancon-Balboa		Total	
	Family	Bachelor	Family	Bachelor	Family	Bachelor	Family	Bachelor	Family	Bachelor	Family	Bachelor
Total number to be replaced June 30, 1926.....	347	276	148	23	0	0	135	60	468	472	1,098	831
Replacements:												
1927.....	49										49	
1928.....	80										80	
1929.....	65										75	
1930.....	16								10	40	46	40
1931.....	1								30		71	
1932.....	46								70		71	
1933.....	10	100							25		22	100
1934.....	1		15						12		26	
1935.....			50	132					10		51	32
1936.....			57		26	24			1		83	24
1937.....					37	12					37	12
Total replacements.....	268	100	122	32	63	36			158	40	611	208
Remaining to be replaced after 1937.....	79	176	26	0			272	24	310	432	487	623

<sup>1</sup> Includes additional bachelor quarters required at Gatun on account of increase in lock force because of 40-hour week.

<sup>2</sup> The quarters built at Gamboa will replace quarters at Pedro Miguel and other districts.

The quarters under construction at the new town site of Gamboa constitute a replacement of old quarters in other districts from which employees will be transferred to Gamboa.

The total cost of constructing the quarters between 1927 and 1937, inclusive, shown in the table, including the estimated cost of completing the quarters to be built during the fiscal year 1937, has been \$4,883,998, not including town site extension, general grading, or exterior electrical work. The construction cost includes necessary furniture installed in the quarters.

It is estimated that it will cost about \$5,700,000 to complete the replacement of the 487 family and 623 old bachelor apartments shown in the table as in need of replacement. This includes about \$475,000 for grading work, road, sewer, and water-line replacement, and contingencies, such as probable price increase for material as business recovers. So far as the Panama Canal is concerned, it will be convenient to pursue this work at the rate of about \$500,000 per year, which will extend it over a period of 10 or 12 years.

#### CONTRACT CONSTRUCTION

For many years the construction by hired-labor method of all new buildings for the Panama Canal and the Panama Railroad was handled by the constructing quartermaster's division of the Canal organization. During the fiscal year 1934 comparatively little new construction work was authorized, and at the end of the year the forces had shrunk to maintenance proportions. For the fiscal year 1935 contracts were entered into for 27 houses to be constructed in connection with the replacement program at Gatun and 2 at Ancon, and for an oil and paint storehouse at Mount Hope. In 1936 further contracts were signed for the erection of 34 additional replacements at Gatun, as well as 28 dwellings at the new Gamboa town site.

Under this plan the Panama Canal furnishes plans and specifications and all material entering into the construction of the buildings. The contractor provides necessary material of American manufacture for concrete forms, scaffolds, etc. Construction of the buildings by contract has progressed in a satisfactory manner.

#### MOTOR AND ANIMAL TRANSPORTATION

The transportation division is charged with the operation and maintenance of all motor and animal transportation furnished to all departments and divisions of the Panama Canal and Panama railroad. It is required to operate on a self-sustaining basis, primarily with a view to supplying transportation at a minimum cost to the Panama Canal and railroad organizations. Work is also performed

for employees and for contractors doing such work for the Government in the Canal Zone. The usual amount of heavy hauling in connection with various buildings and highway construction projects was accomplished throughout the year.

During the year 37 cars and trucks were retired and 64 purchased. At the close of the year there were on hand 348 cars, trucks, trailers, and cranes, 6 motorcycles, 3 mowing machines, and 9 mules. Revenues exceeded expenditures by \$53,461.80 as compared with a net revenue of \$45,911.88 in 1935.

#### THE PANAMA CANAL PRESS

The operations of the Panama Canal Press were continued under the same policy as in previous years. The printing plant carries in stock and manufactures such necessary stationery, forms, etc., that are required on the Isthmus in connection with the operation of the Panama Canal and the Panama railroad. It is also charged with the printing of the official publication, the Panama Canal Record. The manufactured output for 1936 amounted to \$153,533.30, as compared with \$152,089.56 for the previous year. The total output for the year 1936, including supplies not processed in the printing plant, was \$189,690.02 from which a gross income of \$206,918.65 was received, resulting in a net revenue of \$17,228.63. The annual inventory value of material on hand at the close of the year was \$66,716.97, as compared with \$65,973.41 for the fiscal year 1935.

#### REVENUES DERIVED FROM THE RENTAL OF LANDS IN THE CANAL ZONE

Rentals on building sites and oil-tank sites in the Canal Zone totaled \$41,521.31 for the year, as compared with revenues of \$41,632.25 in 1935. Rentals of agricultural lands in the Canal Zone totaled \$14,714.59 as compared with \$17,934.78 for the preceding year. At the close of the fiscal year a total of 1,297 licenses were in effect, covering 2,758½ hectares of agricultural land within the Canal Zone. This is a reduction in the number of licenses under the previous fiscal year of 138, and a reduction in the area held under licenses of 490 hectares. This reduction was largely the result of the policy outlined in the Governor's circular of May 27, 1935, providing that as a health measure no more licenses for agricultural lands would be issued and that no sales or transfers of holdings under licenses would be permitted.

The land office disposed of two claims for agricultural improvements on account of the construction of the town site of Gamboa, the total amount paid for the purchase of these improvements being \$4,400. This transaction was in accordance with the policy pursued in canceling all agricultural licenses within a radius of 1 mile of the limits of the town site, excepting those on the Gaillard Highway.

**BUSINESS OPERATIONS UNDER THE PANAMA RAILROAD CO.**

The Panama Railroad Co. was incorporated in 1849 under the laws of the State of New York for the purpose of building and operating a railroad across the Isthmus. In 1904, before actual construction work on the Panama Canal was started, the United States Government secured control of the capital stock of the Panama Railroad Co. which it now owns completely and has operated the company since that date through a board of directors appointed by the Secretary of War, who holds all the stock of the company except the qualifying shares of the directors. By Executive order of May 9, 1904, the President of the United States directed that the general policy of the railroad be controlled by the United States and that the road be made an adjunct to the Panama Canal, at the same time carrying on its operations as a common carrier. Since that time the corporation has established and operates various business activities upon the Isthmus incidental to the construction, operation, and maintenance of the Canal. Thus the United States Government is conducting the business activities relating to the Canal enterprise under two distinct organizations: first, the Panama Canal, which is a direct branch of the Government; and second, the Panama Railroad Co., which is a Government-owned corporation. As the activities of the railroad company are covered in detail in its annual report, only the major features of operation as they relate to the Canal administration are covered in this section.

In addition to the operation of the railroad, the enterprises of the Panama Railroad Co. include commissaries, which are retail general stores catering primarily to Government employees, cargo handling activities at the harbor terminals, hotels, coaling plants, a steamship line, telephone system, and certain real estate operations in the Republic of Panama.

The operations of the railroad proper, harbor terminals, coaling plants, stables, and baggage transfer were continued throughout the year under the direction of the general manager of the railroad; the telephone system under the electrical engineer; renting of lands and buildings under the land agent; and commissaries, Hotels Washington and Tivoli, and subsidiary activities under the chief quartermaster.

Business operations on the Isthmus, carried on by the Panama Railroad Co. yielded a profit of \$1,077,987.07 for the fiscal year, as compared with \$927,642.87 during the previous fiscal year, an increase of \$150,344.20, or 16.2 percent.

A summary of the 1936 operations is given in the paragraphs following:



## TELEPHONES AND TELEGRAPHS

The gross revenue from the operation of telephones, electric clocks, and electric printing telegraph machines amounted to \$231,945.31, and the total expenses were \$166,613.42, leaving a net revenue of \$65,331.89, as compared with \$67,241.38 for the preceding year, or a decrease of \$1,909.49 from last year.

During the year 1,332 telephones were installed and 1,278 were removed, resulting in a net increase of 54 telephones for the year. At the end of the fiscal year the telephones on the system, maintained by this section, numbered 2,865 as compared with 2,811 at the end of last year.

## RECEIVING AND FORWARDING AGENCY

*Harbor terminals.*—The gross revenue from harbor terminals operations during the fiscal year amounted to \$1,662,460.88; operating expenses were \$1,322,306.15, leaving a net revenue of \$340,154.73, as compared with \$355,033.79 in 1935.

There were 1,856,560 tons of cargo stevedored and transferred, as compared with 1,788,852 tons in 1935, an increase of 67,708 tons. During the year 4,584 cargo ships and 1,306 banana schooners were handled, as compared with 4,439 cargo ships and 1,238 banana schooners in 1935. Agency service was furnished to 161 commercial vessels, as compared with 150 in the preceding year.

*Canal Zone for orders.*—As an aid in the distribution of goods to areas served by steamship lines using the Panama Canal or its terminal ports, there was established in 1925 the arrangement known as "Canal Zone for orders." Under this system merchandise is shipped to Canal Zone ports (Cristobal and Balboa) to be held there in warehouses of the Panama Railroad Co. for orders. Such cargo or integral parts of it may be withdrawn as the consignor or consignee may desire for forwarding to ports beyond Panama. Many different commodities were handled in this manner during the year; the total cargo received under the arrangement was 1,082 tons. This was a decrease of about 61 percent from the tonnage received during the previous year. The great reduction in this business has been due principally to the discontinuance on December 1, 1933, of local deliveries into the Republic of Panama and the Canal Zone. The revenue received for handling and storage amounted to \$5,287.18, as compared with \$8,422.77 for 1935, a decrease of 37 percent.

## COMMISSARY DIVISION

The commissary division is charged with the ordering, storage, and sale of all food supplies, clothing, and other similar items. In carrying out these functions it operates an abattoir, cold-storage

plants, various manufacturing plants, a laundry, wholesale warehouses, and retail stores. In general, sales are restricted to the operating and defense forces of the Canal, to other United States Government personnel stationed on the Isthmus, to the United States Fleet and other United States Government vessels. Sales to commercial steamships were restricted to cold storage, food, and other essentials and approximated \$300,000 during the year.

Net sales for the year totaled \$7,568,551.90, as compared with \$7,122,770.33 for 1935. Gross operating expenses, including cost of goods sold, transportation expenses thereon, plant and processing expenses and costs, salaries and wages, depreciation, repairs, etc., aggregated \$7,287,825.93, resulting in a net operating profit of \$280,726.05 for the year's operations.

At the close of the fiscal year, the value of merchandise on hand was \$1,160,408.72. The relationship between sales and inventory indicates a theoretical stock turnover every 2½ months.

*Sales.*—The distribution of sales as compared with the 2 preceding years was as follows:

	1934	1935	1936
U. S. Government (Army and Navy).....	\$664, 593. 94	\$704, 814. 46	\$941, 915. 59
The Panama Canal.....	496, 083. 02	730, 142. 37	731, 719. 84
The Panama R. R.....	234, 266. 73	301, 315. 52	258, 923. 08
Individuals and companies.....	406, 556. 18	246, 994. 81	312, 432. 26
Commercial ships.....	330, 570. 82	355, 954. 92	304, 547. 29
Employees.....	4, 654, 620. 74	5, 114, 279. 59	5, 372, 401. 92
Total sales.....	6, 786, 691. 43	7, 453, 501. 67	7, 921, 939. 98
Less discounts, credits, etc.....	278, 508. 08	330, 731. 34	353, 388. 00
Net revenue from sales.....	6, 508, 183. 35	7, 122, 770. 33	7, 568, 551. 98

*Purchases.*—Purchases during the year aggregated \$5,609,853.91, an increase of \$551,295.92, or 11 percent, as compared with the previous year. The following tabulation shows the value of the various classes of materials purchased, and the market in which purchased, as compared with the 2 preceding years:

	1934	1935	1936
Groceries.....	\$1, 253, 372. 31	\$1, 362, 659. 95	\$1, 603, 081. 68
Candy and tobacco.....	324, 182. 64	295, 436. 93	340, 615. 47
Hardware.....	260, 035. 89	326, 924. 97	363, 354. 44
Dry goods.....	624, 581. 16	644, 941. 72	713, 353. 09
Shoes.....	161, 987. 18	191, 027. 72	209, 211. 03
Cold storage.....	922, 678. 32	1, 071, 593. 04	1, 030, 776. 67
Raw material.....	340, 647. 14	447, 224. 51	438, 402. 11
Cattle and hogs.....	9, 217. 64	103, 117. 02	180, 409. 75
Milk and cream.....	131, 058. 85	156, 517. 02	160, 865. 82
Dairy products.....	407, 767. 69	459, 115. 11	569, 783. 85
Total.....	4, 435, 528. 82	5, 058, 557. 99	5, 609, 853. 91
Place of purchase:			
United States.....	3, 569, 568. 40	4, 096, 955. 52	4, 307, 369. 53
Europe and Orient.....	472, 386. 34	440, 434. 74	614, 907. 18
Central and South America.....	101, 261. 13	104, 997. 09	150, 421. 78
Local.....	104, 353. 12	208, 835. 47	311, 825. 09
Panama Canal.....	67, 445. 14	64, 394. 57	72, 374. 44
Cattle industry.....	120, 514. 69	142, 940. 00	152, 955. 89
Total.....	4, 435, 528. 82	5, 058, 557. 99	5, 609, 853. 91

*Manufacturing and other plants.*—The output of the various plants of the commissary division during the past year had a total value of \$1,604,440.76, as compared with \$1,297,405.45 for the preceding year. This is an increase of \$307,035.31, or 23.7 percent, of which \$73,530.49 was due to the reopening of the sausage factory. The balance of the gain over the previous year was caused by increased activity in many other plants as covered in the following paragraphs.

Among the principal products of the bakery were 4,307,400 loaves of bread, 130,606 dozen rolls, 35,696 pounds of cake, 17,686 dozen doughnuts, 408,078 pounds of soda crackers, and 48,835 dozen cookies. The value of the output was \$281,546.83.

In the coffee-roasting plant, 435,462 pounds were roasted for the Army. Of the commissary brands of coffee, 228,076 pounds were roasted, an increase of 6,064 pounds in comparison with 1935. In the packing department, 1,794,294 packages of foodstuffs, totaling 5,479,449 pounds, valued at \$213,011.65, were packaged.

The value of items turned out by the industrial laboratory totaled \$269,470, an increase of approximately \$29,500 in comparison with 1935.

An increase in the production and consequently in both the gross and the net revenues was made by the Ancon laundry. There was a gain of 990,000 pieces laundered and a gain of \$35,500 in gross revenue. There was a continuance of the return of work from the enlisted men in the Army which was lost a few years ago when new prices went into effect.

The output of the ice-cream and milk-bottling plant included 124,130 gallons of ice cream, 1,053,524 quarts of milk, 25,201 quarts of cream, having a combined value of \$318,416.90.

The greater portion of fresh beef consumed locally for the year was purchased from dealers in the Republic of Panama under competitive bid. Under this arrangement 4,008 head of fat cattle were purchased and slaughtered during the year. Owing to advanced prices in United States beef, the consumption of this commodity is running about 91 percent native and 9 percent States'. An outstanding feature of cold-storage operations for the year was the reopening of the sausage factory, which was made possible due to the decrease in the price of meats. This operation was discontinued 2 years previously because of high meat costs which contributed toward inability to operate profitably in competition with States' products.

## HOTELS

The hotels Tivoli and Washington were operated by the Panama Railroad Co. without change of policy. These hotels are operated

as adjuncts to the Canal for the purpose of providing suitable accommodations to people having business with the Canal, foreign visitors, American tourists, visiting Government officials, and others. The cost of operating the Hotel Tivoli during the year was \$184,687.14, or \$2,605.87 more than the revenue derived. The operating cost of the Hotel Washington was \$176,550.34, or \$23,095.53 more than the revenue derived. Operating expenses of the Hotel Washington include an increase in unexpended reserves over last year of \$10,818.24.

The Hotel Tivoli reserves for the year 1936, together with \$13,889.27 of previously unexpended reserve funds, were used for necessary repairs to the building on account of continued severe termite attack, as well as the general deteriorated condition of the building. The replacement of this old building with a new modern concrete hotel is a part of the 6-year plan now in progress, and it is hoped this construction may be started during 1939 as outlined.

The operation of the Hotel Tivoli by the Panama Railroad Co. during the past 7 years shows a gross excess of expenses over revenues of \$222,590.52. However, included in the charges to expenses for the period is \$121,255.93 paid to the Panama Canal for amortization of the capital account for the building and equipment and a total of \$59,267.36 in unexpended reserves, leaving a total of \$180,523.29 of the expenses as charged still in the possession of the Government or an actual net deficit of \$42,067.23.

#### MINDI DAIRY

Total milk production at the Mindi dairy amounted to 270,375 gallons, or an increase of 21,546 gallons in comparison with the previous year. Ninety-nine head of purebred Jersey cows and 8 purebred Jersey bulls were purchased in the United States at a cost of \$9,681.14 and added to the dairy herd.

#### PANAMA RAILROAD LANDS AND LEASES

There were in effect at the close of the fiscal year 1936 a total of 1,494 leases and 16 licenses covering the use of Panama Railroad properties in the cities of Panama and Colon. The gross revenue to the Panama Railroad from these leases and licenses during the year was \$234,334.07 which is a decrease of \$7,315.31 from the fiscal year 1935.

During the year the railroad company allowed a discount of 25 percent to all lessees who were paying the full commercial rental, provided they paid their accounts during the period for which the

bills were rendered. Those properties rented at low rates under old leases were not given the reduction. The discount amounted to \$63,534.85.

Forty-one new leases were issued during the fiscal year. Eleven leases on which no improvements had been erected were canceled upon the request of the lessee. One permit was canceled.

During the year 778.58 square meters of Panama Railroad land in the city of Panama were sold for \$14,841.53.

### COAL

The sale of coal from the plants at Cristobal and Balboa totaled 41,813 tons, as compared with 43,696 tons in 1935, a decrease of 1,883 tons, or approximately 4 percent. Purchases during the year totaled 54,925 tons. Total revenue from the sale of coal and the extra charges for handling was \$333,498.82. The cost of sales, including operating expenses, was \$278,726.13, resulting in a net profit of \$54,772.69, as compared with a profit of \$42,036.02 in the previous fiscal year. This improved showing was due to a reduction in the cost of coal as the operating expenses increased from \$62,824.82 in 1935 to \$71,464.55 in 1936.

The basic prices were \$7.75 per ton at Cristobal and \$10.75 at Balboa. Effective September 1, 1935, a sliding scale price reduction was made for sales in large quantities.

### THE PANAMA RAILROAD

The gross revenue during the fiscal year 1936 from the operations of the Panama Railroad proper (not including subsidiary business activities) amounted to \$1,456,164.54. The operating expenses were \$1,250,765.39, leaving a net revenue of \$205,399.15 for the year, as compared with \$141,381.09 for the previous year, an increase of \$64,018.06.

Tonnage of revenue freight transported during the year amounted to 309,379, as compared with 270,334 in 1935, an increase of 39,045, or approximately 14 percent.

Statistics covering the various features of railroad operations during the past 3 years are presented in the following table:

	1934	1935	1936
Average miles operated, Colon to Panama.....	47.61	47.61	47.61
Gross operating revenue.....	\$1,429,784.27	\$1,280,669.58	\$1,456,164.54
Operating expenses.....	\$1,142,309.48	\$1,139,288.49	\$1,250,765.39
Net operating revenue.....	\$287,474.79	\$141,381.09	\$205,399.15
Percent of expenses to revenue.....	79.77	88.96	85.90
Gross revenue per mile of road.....	\$29,729.75	\$26,899.17	\$30,585.27
Operating expense per mile of road.....	\$23,764.20	\$23,929.60	\$26,271.06
Net revenue per mile of road.....	\$6,028.55	\$2,969.57	\$4,314.21
Number of passengers carried:			
First class.....	162,501	184,355	161,813
Second class.....	196,597	211,959	177,631
Total.....	359,098	396,314	339,444
Revenue per passenger-train-mile.....	\$3.76	\$3.91	\$3.89
Revenue per freight-train-mile.....	\$11.83	\$9.26	\$10.99
Total revenue-train mileage.....	183,143	182,659	195,346
Railroad revenue per train-mile.....	\$7.74	\$7.01	\$7.45
Railroad operating expense per revenue-train-mile.....	\$6.18	\$6.24	\$6.40
Net railroad revenue per revenue-train-mile.....	\$1.57	\$0.77	\$1.05
Freight, passenger, and switch locomotive mileage.....	280,358	279,281	293,942
Work-train mileage.....	6,318	8,686	4,803
Passenger-train mileage.....	111,076	111,581	122,904
Freight-train mileage.....	72,067	71,078	72,442

### PANAMA RAILROAD STEAMSHIP LINE

The gross operating revenue for the steamship line for the fiscal year ended June 30, 1936, amounted to \$1,201,829.78, and the gross operating expenses amounted to \$1,570,306.40, resulting in a net deficit from operations of \$368,476.62. The operating deficit compared with the net loss for the fiscal year ended June 30, 1935, of \$357,633.82, shows a decrease in the net revenue of \$10,842.80.

For the year ended June 30, 1936, the tonnage carried by the steamship line amounted to 159,371 tons, as compared with 163,304 tons in the previous year.

The steamship line carried freight and passengers for account of the Panama Canal and other departments of the Government of the United States at material reductions from tariff rates, which amounted to the important sum of \$487,332.44. Had regular tariff rates been received by the steamship line for such freight and passenger services performed for the Panama Canal and other Government departments, its income would have been increased by \$487,332.44 and its operations for the year would have resulted in a profit of \$118,855.82.

### SECTION III

#### ADMINISTRATION

##### DEPARTMENTS

The organization of the Panama Canal on the Isthmus embraces five principal departments—namely, operation and maintenance, supply, accounting, executive, and health. In addition to this, an office is maintained in Washington, D. C. The Panama Railroad Co., a Government-owned corporation, is a distinct unit, yet it is closely affiliated with the Canal organization.

##### OPERATION AND MAINTENANCE

The department of operation and maintenance embraces functions related to the actual use of the Canal as a waterway, including the dredged channel, locks, dams, and aids to navigation, accessory activities such as shops and drydocks, vessel inspection, electrical and water supply, sewer systems, roads and streets, hydrographic observations, surveys and estimates, and miscellaneous construction other than the erection of buildings.

##### SUPPLY

The supply department is charged with the accumulation, storage, and distribution of materials and supplies for the Panama Canal and railroad; the maintenance and construction of buildings; the assignment of living quarters to employees and care of grounds; the operation of storehouses, fuel-oil plants, an experiment garden and a printing plant, and the supplying of motor transportation facilities to the various departments and divisions of the Canal and railroad organizations.

##### ACCOUNTING

The accounting department is responsible for the correct recording of financial transactions of the Canal and railroad; the administrative auditing of vouchers covering the receipt and disbursement of funds preliminary to the final audit by the General Accounting Office; cost keeping of the Canal and railroad; the checking of time

keeping; the preparation of estimates for appropriations and the allotment of appropriations to the various departments and divisions; and the examination of claims.

### EXECUTIVE

The executive department embraces the general office business of the Governor and all administrative activities invested by Executive order within the authority of the executive secretary. Under this department come the administration of police and fire protection, postal service, customs, shipping-commissioner work, estates, schools, general correspondence, and records for the organization of the Canal and the Panama Railroad, personnel records and administration, wage adjustments, statistics of navigation, information and publicity, relations with Panama, and the operation of clubhouses, restaurants, moving-picture theaters, playgrounds, etc.

### HEALTH

The health department has jurisdiction over all matters pertaining to sanitation and public health within the Canal Zone and the cities of Panama and Colon, the operation of hospitals and dispensaries, the enforcement of quarantine regulations, and supplying of the data from which vital statistics for the Canal Zone and the cities of Panama and Colon are compiled.

### PANAMA RAILROAD CO.

The operations of the Panama Railroad Co. on the Isthmus are generally related closely to the work of the Canal. As the Governor of the Panama Canal is President of the Panama Railroad Co., the heads of departments of both the Canal and railroad organizations report to him. The general administration of the composite organization is centered in the executive office, and the accounting work in the accounting department; the Panama Railroad and the business divisions of the Canal organization are billed for their proper share of the general overhead work.

### CHANGES IN PERSONNEL AND ORGANIZATION

The following changes in organization and administrative personnel occurred during the year:

*Division of personnel administration.*—To make possible a more thorough system of personnel selection, studies of personnel policies and administration, and the maintenance of adequate personnel records for both gold and silver employees, an administrative and functional reorganization of personnel administration was effected



during April 1936. This reorganization involved the establishment of three bureaus in the division with duties as follows: The administrative bureau, having charge of personnel records of gold employees, and being responsible for the conduct of personnel matters related to complaints, leave, retirement, transportation, organization, citizenship, and requisitions for employees; the service bureau, to assist heads of departments and divisions in the selection of applicants for employment, to make studies looking toward the welfare and improvement of personnel and the correction of any unsatisfactory working conditions, to cooperate with apprentice-learner committee in the handling of apprenticeship and learnership programs, and to have charge of applications for employment and of civil service matters; and the silver personnel bureau, in charge of personnel administration for silver employees, to handle applications for employment, examinations, and records pertaining to such personnel. The three bureaus function under the general supervision of the chief personnel officer, in charge of the division of personnel administration.

In order to carry forward the development and administration of the personnel program, it was necessary to recruit a staff of professionally trained and experienced personnel men, three being placed in the service bureau and one in the silver personnel bureau. The work carried forward as a result of this reorganization during the remainder of the fiscal year was largely a program of development, including studies of previous personnel policies and desirable changes, and looking to the development of those aspects of personnel administration not previously covered. The program for American employees included special attention to the following phases: The development of a more adequate service rating (the new rating system will go into general administrative use early in the fiscal year 1937); development of more satisfactory employment methods, procedures and forms necessary to render a better employment service to department heads; consolidation, bringing up to date, and preliminary review of application files; preparation and administration of examinations for saleswomen, apprentices and learners, and setting up of appropriate registers of eligibles in cooperation with department heads; close cooperation with department heads in the careful utilization of the apprentice-learner program; and detailed studies of job analyses, job specifications, trade tests, and interviews in determining applicants' qualifications.

In personnel work for the silver employees the major features are discussed in another section of this report under "Registration of native workers." In addition to that work the silver personnel bureau handled about 6,000 applications from employees and members of their families resident in Panama for securing the *cedula* required by decree of Panama.

*Plans section.*—The organization and purposes of the plans section were briefly outlined in the previous year's annual report. During the past year the section continued the work originally assigned to it as an auxiliary administrative agency. In contrast to the previous fiscal year, the greater part of the work performed during the fiscal year 1936 was in connection with the Panama Canal. However, a considerable amount of work was also done for the railroad company, especially concerning the railroad proper.

A review was made of the depreciation policies in effect relative to the Panama Railroad Co.'s Isthmian properties, which resulted in an adjustment of the depreciation rates covering various items of plant and equipment. In connection with the studies of the railroad, a complete analysis of both the freight and passenger business, past, present, and probable future, was made. As a result of various reports on the operation of the docks and piers, supplemental to those completed last year, all commercial docks and piers were turned over to the harbor terminals division of the Panama Railroad Co. to operate and a rental determined to be fair to both interests is being paid to the Canal for the use of its docks and piers. Depreciation rates were also changed to conform to actual physical conditions. A study of the Ancon laundry and field laundries operated by divisions of the Canal resulted in a lower price list on certain articles for the Ancon laundry and a consequent abandonment of two of the field laundries.

Three reports covering the bureau of clubs and playgrounds were made. The first, covering operations, resulted in the dividing of the bureau into two units, namely, clubhouses and playgrounds, the former being completely self-supporting except for depreciation and interest on buildings, and the latter being supported chiefly by appropriations. The previous annual appropriation of \$125,000 has been reduced to \$100,000 and playground activities are being expanded from \$70,000 to \$100,000 annually. The second report, covering capitalization, depreciation, and maintenance, revised the set-up of capital and depreciation to agree with the new form of organization; and the third, covering building program, outlined a complete building program including sizes and types of buildings, allotment of space to the various activities in each, and dates for replacement of existing buildings.

As a result of the studies and reports on capitalization, depreciation, and maintenance, covering various departments of the Canal, the following changes were effected. Annual charges for depreciation and repairs on individual units of floating plant in the marine and dredging divisions were set up in accordance with actual physical conditions; while there were no appreciable changes in total annual charges, considerable changes were made in charges for the individual

units involved. Changes were made in the accounts of the fuel-oil plants to bring the annual charges into line with present policies covering replacement and expansion of plant. The annual charge for depreciation of certain parts of the Canal fixed property, capitalized at \$55,000,000, was revised as of July 1, 1936.

Performance indexes were established for the coaling plants, commissary division, including Ancon laundry and other plants, harbor terminals, hotels Tivoli and Washington, motor transportation division, real-estate operations, and for traffic through the Canal. These indexes cover the important features of the operations of the unit concerned and are to be used to supplement other reports.

Various surveys, studies, and reports on the personnel practices of the Canal-Railroad were made with the object of comparing them with the best practices in the United States. This work has been transferred to the division of personnel administration and is more fully covered in another section of this report.

Various studies started during the fiscal year 1936 will be continued during 1937, the principal ones being as follows: Maintenance of railroad rolling stock; operation of oil-handling plants; district quartermasters' operations, including maintenance of quarters; building program, gold quarters; interchange of free service, Panama Canal and Panama Railroad; port and terminal charges; capitalization, depreciation, and maintenance of the general storehouses, and the water supply system; survey of painting. There are 12 additional major studies scheduled to be made.

*Counsel.*—The office of counsel, the Panama Canal, was established on October 1, 1934. On March 18, 1936, with a view to effecting a better coordination of the legal and allied activities of the Panama Canal and its adjunct, the Panama Railroad Co., there were discontinued the separate offices of counsel of the Panama Canal and counsel of the Panama Railroad Co., and the office of general counsel was established in lieu thereof. Under the present organization, the general counsel performs the duties formerly assigned to the counsel of the Panama Canal and in addition, under his appointment as special counsel of the Panama Railroad Co., he has supervision and direction of the legal organization and legal activities of the Panama Railroad Co. on the Isthmus. Mr. F. H. Wang, formerly counsel of the Panama Canal, was appointed general counsel for the Canal organization, as well as special counsel for the Panama Railroad Co. on the Isthmus.

The general counsel is the legal advisor on the Isthmus in matters pertaining to the administration of the Canal enterprise and performs such other duties concerning legal and legislative questions and matters of public policy as may be directed from time to time by the Governor. The duties of the general counsel are separate from

those of the district attorney, who, under the law, conducts all legal proceedings for the Government of the United States and the Government of the Canal Zone.

*Appointments.*—Appointments in official positions during the fiscal year 1936 were as follows:

Mr. C. M. Lupfer was appointed chief clerk, executive department, on August 1, 1935, vice Mr. John H. Smith, deceased.

Comdr. John G. Moyer, United States Navy, was appointed assistant to marine superintendent on September 27, 1935, and on October 16, 1935, was appointed captain of the port (Cristobal), vice Capt. Thomas A. Symington, United States Navy, upon relief of the latter from duty with the Panama Canal.

Lt. Comdr. Bertram J. Rodgers, United States Navy, was appointed captain of the port (Balboa), on October 16, 1935, vice Lt. Comdr. Leon B. Scott, United States Navy, upon relief of the latter from duty with the Panama Canal.

The position of first assistant chief quartermaster was established on February 1, 1936, and Mr. James H. K. Humphrey was appointed to the office.

The position of second assistant chief quartermaster was established on February 1, 1936, and Mr. Lew W. Lewis was appointed to the office.

Mr. Lewis B. Moore was promoted from chief of section (plans), executive department, to office engineer, department of operation and maintenance, on February 1, 1936, vice Mr. Lew W. Lewis, transferred.

The office of general counsel, the Panama Canal, was established by the Governor on March 18, 1936, and Mr. Frank H. Wang was appointed to the office.

Mr. Homer A. A. Smith was appointed assistant to Governor on April 1, 1936, and on July 1, 1936, was appointed comptroller, the Panama Canal, vice Mr. Elwyn Greene, retired.

The position of director of admeasurement (temporary) was established on April 20, 1936, and Mr. Frederick DeV. Sill was appointed to the office.

Maj. Wilhelm D. Styer, Corps of Engineers, United States Army, was appointed assistant engineer of maintenance on May 19, 1936, vice Lt. Col. William E. R. Covell, Corps of Engineers, United States Army, upon relief of the latter from duty with the Panama Canal.

The office of assistant general counsel was established by the Governor on June 2, 1936, and Mr. Paul A. Bentz was appointed to the office.

Col. Henry G. Pillsbury, Medical Corps, United States Army, has been appointed to sail from New York about August 25, 1936, as

replacement for Col. Orville G. Brown, Medical Corps, United States Army, present chief health officer, now on terminal leave to expire September 2, 1936.

### FORCE EMPLOYED

The supervisory, technical, higher clerical, and highly skilled mechanical employees, who are primarily citizens of the United States but include Panamanians and a few of other nationalities, are employed on what is known as the "gold roll." The rest of the force, principally natives of the tropics but including a few citizens of the United States, engaged on low-paid work, are designated "silver" employees. These terms are derived from the former tropical practice of paying Americans and Europeans in gold, while the native or tropical labor was paid in local currency, usually based on silver.

### GOLD EMPLOYEES

The distribution of the gold personnel on June 5, 1935, and June 3, 1936, is shown in the following tabulation:

Department or division	Gold force		Decrease	Increase
	June 5, 1935	June 3, 1936		
Panama Canal:				
Accounting department.....	159	160	-----	1
Dredging division.....	162	190	-----	28
Engineer of maintenance, assistant:				
Office engineer.....	36	67	-----	31
Surveys—meteorology.....	23	25	-----	2
Electrical division.....	155	172	-----	17
Locks division.....	268	264	4	-----
Municipal division.....	114	113	1	-----
Executive department:				
Executive offices.....	129	141	-----	12
Clubs and playgrounds.....	58	57	1	-----
Bureau of posts.....	58	61	-----	3
Civil affairs and customs.....	14	15	-----	1
Fire protection.....	43	42	1	-----
Police and prisons.....	139	153	-----	14
Magistrates' courts.....	4	5	-----	1
Schools.....	126	138	-----	12
Collector.....	13	15	-----	2
Paymaster.....	11	12	-----	1
Fortifications.....	7	6	1	-----
Health department.....	273	296	-----	23
Madden Dam division.....	22	-----	22	-----
Marine division.....	181	179	2	-----
Mechanical division.....	437	435	2	-----
Supply department:				
Offices, chief quartermaster.....	9	10	-----	1
Constructing quartermaster.....	55	76	-----	21
District quartermasters.....	26	25	1	-----
Farm bureau.....	2	2	-----	-----
Fuel oil plant.....	33	36	-----	3
Storehouses.....	40	44	-----	4
Motor-car repair shop.....	28	30	-----	2
Motor transportation.....	40	43	-----	3
Panama Canal press.....	13	13	-----	-----
Total, the Panama Canal.....	2, 678	2, 825	35	182
Panama R. R. Co.:				
General manager:				
Offices.....	22	23	-----	1
Railroad transportation.....	79	76	3	-----
Receiving and forwarding agency.....	89	87	2	-----

Department or division	Gold force		Decrease	Increase
	June 5, 1935	June 3, 1936		
Panama R. R. Co.:—Continued.				
Supply department:				
Commissary division.....	203	206		3
Hotels.....	13	13		
Dairy farm.....	3	3		
Total, Panama Railroad.....	409	408	5	4
Total force.....	3,037	3,233	40	186

Increases occurred in 22 of the 37 units of the organization and decreases in 11. A gain in the section of office engineer was due to the employment of temporary men in order that detailed designs, specifications and final estimates on all projects may be completed one year before construction begins. The force of the dredging division was augmented for the purpose of adding extra shifts to a drill barge and dipper dredge and attendant floating equipment. The extra force in the health department included several additions to the staff at Gorgas Hospital. In the constructing engineer's force the gain was due principally to the employment of apprentices and a number of men to supplant regular employees being used as inspectors on building contract jobs. The increase in the electrical division was due to the employment of eight apprentices and various skilled employees. The decrease in the Madden Dam division was due to the abolishment of that division.

#### RECRUITING AND TURNOVER OF FORCE

The following table shows additions to the gold force and separations from it in the fiscal year from July 1, 1935, to June 30, 1936. Employments are classified as made in the United States or on the Isthmus and separations are classified by cause.

	Operation and maintenance	Executive	Supply	Health	Accounting	Panama Railroad	Total
Employed or reemployed in the United States.....	60	35	2	46	2	3	148
Employed or reemployed on the Isthmus.....	102	45	44	35	6	14	246
Total additions.....	162	80	46	81	8	17	394
Resigned.....	21	25	5	36	5	12	104
Retired:							
Age.....	10	6	1		1	5	23
Disability.....	8	5	2			2	17
Voluntary separation.....	5	1	1	1	1	1	10
Died.....	8	2	2	1	1	4	18
Discharged:							
Reduction of force.....	5		1			1	7
Expiration of temporary employment.....	29	8	17	23	2	4	83
Cause.....	2	1	1			2	6
Disability.....	1	1	1				3
Total separations.....	89	49	31	61	10	31	271

The Panama Canal:		The Panama R. R. Co.:	
Additions.....	377	Additions.....	17
Separations.....	240	Separations.....	31
Net additions.....	137	Net separations.....	14
Net addition to pay roll—Panama Canal and Panama R. R. Co.....			123

Based on an average gold force of 3,166 for the year, the 271 separations give a turn-over rate of 8.6 percent from all causes, as compared with a turn-over rate of 14.9 percent for the fiscal year 1935 based on an average of 3,031 employees. The turn-over rate for the fiscal year 1935 was high because of temporary employment in connection with the biennial overhaul of the locks. Ignoring those separations which were due to the expiration of temporary employment, turn-over rates would be 5.9 percent for the fiscal year 1936, and 7.2 percent for the fiscal year 1935.

The number of persons tendered employment through the Washington office of the Panama Canal, all above the grade of laborer, was 219 as compared with 392 tendered the previous year. The decrease was due principally to the fact that there was no major lock overhaul requiring the employment of additional personnel. One hundred and twenty-nine persons accepted tenders and were appointed, covering 38 different classes of positions. Two thousand seven hundred and one persons (2,400 from New York, 140 from New Orleans, 27 from other Atlantic coast ports, 133 from Pacific coast ports, and 1 via air-transport service), including new appointees, employees returning from leaves of absence and members of their families, were provided transportation from the United States to the Isthmus. This is an increase of 162 over the previous year.

### SILVER EMPLOYEES

The numbers of employees on the silver roll by departments or divisions on the last force reports, June 1935 and June 1936, are shown in the following tabulation. This summary covers the specific days on which the force report is made but it is believed to be fairly representative for most of the divisions. In some divisions the number of employees at work may change by several hundred within a short time, according to variations in the demand for hourly rated labor. The summary shows only those actually at work on June 5, 1935, and June 3, 1936:

Department or division	Silver force	
	June 5, 1935	June 3, 1936
Panama Canal:		
Accounting department.....	3	3
Dredging division.....	928	958
Engineer of maintenance, assistant:		
Office engineer.....	4	4
Surveys—meteorology.....	49	80
Electrical division.....	212	285
Locks division.....	650	658
Municipal division.....	999	915
Executive department:		
Executive offices.....	33	35
Clubs and playgrounds.....	234	214
Bureau of posts.....	18	18
Civil affairs and customs.....	1	1

Department or division	Silver force	
	June 5, 1935	June 3, 1936
Panama Canal—Continued		
Executive department—Continued		
Police and prisons.....	44	44
Magistrates courts.....	2	2
Schools.....	1 109	1 113
Paymaster.....	2	2
Health department.....	839	854
Madden Dam division.....	24	-----
Marine division.....	563	605
Mechanical division.....	794	780
Supply department:		
Constructing quartermaster.....	503	545
District quartermasters.....	345	388
Farm bureau.....	22	20
Fuel oil plant.....	51	55
Storehouses.....	249	248
Motor-car repair shop.....	49	47
Motor transportation.....	138	143
Panama Canal press.....	73	74
Total, the Panama Canal.....	6, 938	7, 091
Panama Railroad Co.:		
General manager:		
Offices.....	61	79
Railroad transportation.....	251	273
Receiving and forwarding agency.....	849	973
Supply department:		
Commissary division.....	1, 009	1, 074
Hotels.....	171	180
Dairy farm.....	86	92
Total, Panama Railroad.....	2, 427	2, 671
Total force.....	9, 365	9, 675

<sup>1</sup> Total silver force employed on last force report day while all schools were in session.

Increases appear in 19 and decreases in 7 of the 33 units employing silver personnel. Electrical division forces made a gain of 73 due to the employment of extra men on various construction projects. The district quartermaster division had an increase in force of 43, of which 17 were temporary employees. The force of the constructing quartermaster increased 42, the larger number of which were employed for carrying on an extensive painting program. Increased activity in the Ancon laundry and other productive plants of the commissary division accounted for the added force of 65 in that division. The increase in force of 124 shown for the receiving and forwarding agency is not representative, as a great number of men are hired by the day, the number depending on the amount of cargo to be handled at the piers. The permanent force of the marine division showed an actual decrease for the year but, as in the case of the receiving and forwarding agency, there are day-by-day gangs. These are employed for handling lines on transiting vessels and the number employed depends on the amount of traffic through the Canal.

Decreases were due to completion of projects and to the transfer of personnel to other divisions.



## WAGE ADJUSTMENTS

## GOLD EMPLOYEES

The Panama Canal Act provides that salaries or compensation for Panama Canal employees fixed thereunder by the President or by his authority "shall in no instance exceed by more than 25 percent the salary or compensation paid for the same or similar services to persons employed by the Government in continental United States." It has been the policy generally to pay to United States citizens employed on the gold roll the full 25 percent above pay for similar work in Government employment in the United States, within the limitations of appropriations and subject to the preservation of coordination within the organization. This is justified by the disadvantages inherent in the climatic, economic, and social conditions prevailing on the Isthmus.

The prevailing allocations of employees under the personnel classification are based on the initial allocations made in 1928 and 1929, immediately following the passage of the Welch Act. Since these original allocations became effective, the duties and responsibilities of some employees have changed appreciably without corresponding changes having been made in the classification of their positions. In April 1936, therefore, heads of departments were requested to review the present allocations of all of their employees included under the classification and to submit recommendations with respect to such regrading as they might consider warranted on the following general principles: (a) The classification of 1928-29 was deemed to be substantially correct; the primary purpose of undertaking a resurvey being to make such adjustments in existing classifications as were warranted by changes in duties and responsibilities; (b) it was clearly understood that no general upward or downward revision in classification was contemplated. As a result of this resurvey approximately 100 requests for reclassification were received by the classification committee from the various department heads. Some of these have already been disposed of and the others are now being investigated to insure proper consideration in all such cases.

The wage board, consisting of the assistant engineer of maintenance and a representative selected by an organization of employees and approved by the Governor, held five meetings during the year in connection with rates of pay for meat cutters, assistant foremen and relief engineers in the oil-handling plants, and in connection with the coordination of salaries of masters, mates, and others on the tug *Favorite*, dipped dredges, and craneboats *Atlas*, *Las Cruces*, and *La Valley*.

The salary board, composed of the heads of the nine major departments and divisions of the Panama Canal and Panama Railroad, held no meetings during the year.

The complaints board, established for the purpose of investigating and reporting on complaints of employees, referred to the board by the Governor about working conditions, held no meetings during the year, no cases having been so referred.

### SILVER EMPLOYEES

Wages of employees on the silver roll, who are primarily natives of the tropics, bear no definite relation to wages of corresponding classes of employees in the United States but are generally established at levels based on those prevailing for tropical labor in the Caribbean area.

Under Executive orders, the maximum rate of compensation authorized for native employees is \$80 per month, or 40 cents per hour, with the exception that these rates may be exceeded in the case of not more than 112 such employees possessing special qualifications. The basic hourly rate of compensation for common labor is 20 cents an hour. It has been at this level since 1922, with later provisos that 21 or 22 cents may be used as the entrance rate where justified. Bonuses authorized in the bulletin on rates of pay, silver roll, are payable only to employees who are shifted temporarily from their regular duties to other duties which involve disagreeable, dirty, or hazardous working conditions not taken into consideration when the employees' regular rates of compensation were fixed.

The rates of pay and other conditions of employment affecting silver employees are reported on by the silver wage board, consisting of the heads of the major departments and divisions and the administrative heads of a few of the smaller organizations which employ a considerable force of native labor. This board held no meetings during the year.

As a further aid in maintaining an equitable scale of rates of pay and maintaining the standard of living of these employees, a weighted price index, reflecting price changes in the commissaries on more than 100 staple items in common use among these workers, has been carried forward for a number of years. With 100 adopted as an index figure reflecting commissary prices in 1914, the index rose to a peak of 168.98 in 1921. The 1936 index figure was 111.09.

### SUPERANNUATED NATIVE EMPLOYEES

The Panama Railroad Co., through the board of directors, has established a provision that native or tropical employees who are no longer able to perform useful service in any capacity may be

removed from the active rolls and be granted an annuity or given a lump-sum payment. Since June 1, 1928, 22 such employees have been given lump-sum payments ranging from \$25 to \$500, and 258 employees have been granted pensions ranging from \$5 to \$30 per month. Since 1928, 58 pensioners have died, been transferred to Corozal Hospital, disappeared, or otherwise become separated from the pension roll, leaving 200 employees receiving annuities at the end of the fiscal year. As of June 30, 1936, the average payment was \$10.58 per month. The following table shows the number of those retired, the number of those granted monthly and lump-sum payments, and the number still receiving monthly payments at the end of the year:

Fiscal year	Lump-sum payments	Monthly payments	Total employees retired	Died or otherwise separated from roll in year indicated							Still living out of year's super-annuities
				1930	1931	1932	1933	1934	1935	1936	
1928.....	-----	1	1	-----	-----	-----	-----	-----	-----	-----	1
1929.....	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
1930.....	7	26	33	4	3	1	2	4	-----	1	11
1931.....	2	13	15	-----	3	2	-----	-----	-----	-----	8
1932.....	2	24	26	-----	-----	3	2	2	4	1	12
1933.....	3	67	70	-----	-----	-----	5	5	2	2	53
1934.....	5	60	65	-----	-----	-----	-----	6	1	1	52
1935.....	2	30	32	-----	-----	-----	-----	-----	3	1	26
1936.....	1	37	38	-----	-----	-----	-----	-----	-----	-----	37
Total.....	22	258	280	4	6	6	9	17	10	6	200

The foregoing applies only to those superannuated native employees who have been in the service of the Panama Railroad Co. There is no provision for the payment of similar disability allowances to superannuated native employees of the Panama Canal. Appropriate legislation to permit the Panama Canal to conform to the practice of the Panama Railroad is outlined and explained further under "administrative problems."

#### REGISTRATION OF NATIVE WORKERS

In 1929 the silver personnel section was established primarily for the purpose of maintaining service records of silver employees. Since that time its functions have increased to maintain more adequate control of the personnel problems involved in the employment and maintenance of personnel records for approximately 11,000 native workers.

At the end of the fiscal year, detailed plans were complete for instituting the major phases of the work which include the fingerprinting of all employees; the issuance of an identification card to replace the present metal check issue; and an employment eligibility program for the native workers involving written examinations, interviews, physical examinations, and limitation of eligi-

bility for employment upon a basis of merit and efficiency. During the year, two examinations were given to determine eligibility on the registers of native workers. It is estimated that more than 2,000 native applicants have been interviewed during the year in connection with the selection of new employees and about 3,000 in connection with identification data.

#### REPATRIATION OF UNEMPLOYED ALIENS

An appropriation of \$150,000 was provided by Congress toward the close of the fiscal year 1934 for the purpose of repatriating unemployed West Indians and their families who have rendered at least 3 years' service with the United States Government or the Panama Railroad Co. In addition to transportation expenses, allowances of \$25 for single men and \$50 for men with families, who may in meritorious cases also receive \$10 for each minor child, are given. These cash allowances are for purposes of rehabilitation in their native countries. The total amount of this rehabilitation allowance may not exceed \$100 for each employee.

Approximately 954 persons have been repatriated since the appropriation became available. These included 454 employees and 500 members of employees' families. Approximately \$36,000 of this fund has been expended at an average expenditure (transportation plus cash allowance) of \$37.74 per person repatriated and an average cost of \$79.30 per employee repatriated.

During the fiscal year 1936 approximately \$8,250 was expended on the repatriation and rehabilitation of 105 former employees accompanied by 100 members of their families. There is an increasing reluctance of these people to accept repatriation due to the increasingly long period that they have resided on the Isthmus, and due to the fact that their children have a somewhat greater opportunity for employment here than in the native land of their parents.

The Canal will continue to offer the opportunity of repatriation and a sum for rehabilitation in their home country to former employees with at least 3 years of service while the fund lasts. This may relieve slightly the unemployment situation in the vicinity but will have little permanent effect under present conditions because of the relatively high birth rates among the tropical inhabitants.

#### APPRENTICE-LEARNER COMMITTEE

The studies conducted by the apprentice committee in connection with apprenticeship training during 1935 developed the fact that there was a need for providing training which would equip young men and women to fill positions outside the skilled craft groups.

Accordingly, in May 1935 the Governor informed the committee that they were to give consideration to the practical preparation of local young Americans as replacements in all classes of positions in which the committee considered satisfactory training courses could be established which would qualify young people for permanent employment in the organization.

In August 1935 an apprentice examination was prepared and administered cooperatively by the division of personal administration, the division of schools, and various department heads, to 59 applicants for apprenticeships in the various skilled crafts. On the basis of the register established from the results of this examination, 35 apprentices were appointed and are now receiving practical training in their respective crafts and related scholastic training from the apprentice-learner coordinator.

After a series of conferences with the division of personnel administration and department heads, the new apprentice-learner committee recommended the establishment of approximately 50 learnerships to meet present needs. The committee also developed a set of regulations for both apprenticeships and learnerships.

During the year, examinations covering five types of learners—electrical, mechanical, business service, scientific, and library—were given to 120 applicants for the various learnerships and 45 appointments have been made on the basis of the registers established. These appointees have entered upon their learnership duties and are now receiving appropriate instruction from the apprentice-learner coordinator.

The number of learners to be employed in the several occupations in the Canal service will depend upon vacancies, funds, and the amount of work on hand or in prospect. In general it is proposed to fill the openings in certain positions or classes of positions in the several departments by learnership except where laws and Executive orders prevent and where the best interests of the Panama Canal require the securing of trained employees from other sources.

#### **PUBLIC AMUSEMENT AND RECREATION**

As private industry is not permitted in the Canal Zone, the supplying and supervising of recreational facilities for Canal employees and their families is the function of the bureau of clubs and playgrounds, a part of the Canal organization. During January 1935 as a matter of administrative expediency this bureau was subdivided into two distinct parts. One of these parts, the club houses, provides those facilities such as restaurants, moving pictures, cigar and newsstand sales, etc., which are ordinarily furnished by private capital. This part of the bureau is self-supporting. The other part of the

bureau, the playgrounds, provides those facilities such as playgrounds, play sheds (gymnasiums), swimming pools, beaches, kindergartens, and a boathouse which are commonly furnished by a civic community to its citizens. This part of the bureau is supported chiefly from appropriations, any incidental revenues received from its facilities being used to help defray expenses.

The past fiscal year was the second in which the restaurants were managed by the clubhouses, the Canal Zone restaurants having been formerly operated by a private contractor. In the fiscal year 1936 the gross revenue of the restaurant activities of the clubhouses was \$330,039, which is a slight increase over the previous year, and comprised an important part of the total revenues of the clubhouses. Motion pictures and sales at the cigar and newsstand counters accounted for a large part of the balance of the gross revenue of the clubhouses.

The playgrounds subdivision cooperates with the division of schools, handling all the required and elective physical educational training courses. This subdivision conducts kindergartens on a regular schedule similar to those of the schools division. It also has general supervision over the athletic activities of the Canal employees, sponsoring among other things swimming, tennis, and track meets, indoor and outdoor baseball games for the school students, basketball games, and archery contests. Archery is gaining in popularity, particularly on the Pacific side, where approximately 200 boys and girls and some adults have taken up the sport. During the past year the physical program has been expanded by the addition to the force of two directresses and a swimming instructor. The Madden Dam clubhouse building served as the recreational center for gold employees of the Panama Canal and the contractors during the construction of the Madden Dam. The continued use of the building has been approved as a project of the playgrounds to be maintained as a screened and somewhat improved camp for the Canal Zone Boy and Girl Scouts of America.

#### EXPERIMENT GARDENS

It was reported in last year's report that the experiment gardens had established a nursery of *Hevea Brasiliensis* (Brazilian rubber) trees for a large rubber company in the United States. The care of this nursery was on a similar basis to that which had been followed in caring for plantings of other outside interests to further agricultural or botanical investigations, the company paying a fair rate for the services. In August approximately 50,000 seedling trees were turned over to the company to be planted on its experimental estate in the Republic of Panama in the vicinity of Gatun Lake. The

company left with the experiment gardens several hundred specimen trees grafted to the highest yielding clones which they had introduced from their selection plantings in the Philippines. Some of the clones left with the gardens are G-1, which produces about 2,700 pounds of dry rubber per acre; G-3, which yielded over 1,000 pounds of rubber per acre when the trees were 5 years old; G-5 yields over 2,000 pounds per acre and is a very reliable yielder. G-6 and G-7 are consistent high yielders, producing about 2,500 pounds of dry rubber per acre. These figures will mean more to the layman when he learns that 450 pounds of dry rubber per acre is the average yield of the rubber estates in Sumatra.

Although experimental work at the gardens has been curtailed to some extent during the past few years, exchanges of seeds and plants with botanic gardens, agricultural departments, experiment stations and individuals, in many parts of the tropics and subtropics, have been maintained. Over 300 new species of plants have been introduced during the past fiscal year alone.

### ADMINISTRATIVE PROBLEMS

One of the major duties of the Governor and his assistants is planning improvements, both in present administration and facilities and in provision for future needs. Brief discussion on some of the more important matters affecting operations are presented herewith.

### LEGISLATION

No reference will be made hereunder to legislation involving appropriations needed for replacements and extension of plant and equipment since this subject is treated elsewhere in this report. There follows a review of legislation of special importance to the Panama Canal enterprise which has been before the Congress during the year. This discussion will be divided into two parts, legislation proposed by the Canal enterprises and general legislative matters pertaining to the Canal Railroad organization.

### CANAL TOLLS—DUAL MEASUREMENT SYSTEM

The continuance in effect of the dual measurement system for determining the amount of tolls to be charged vessels for transiting the Panama Canal remains the one outstanding problem relating to the administration of the affairs of the Canal for which a definite solution has not been found. Legislation to correct the difficulties which have resulted from the establishment of the dual system of measurement has been recommended by successive Canal administrations since 1915 and, although such legislation has been considered

by the Congress many times during the last 20 years, the discontinuance of this inequitable system has not yet been provided for. It is felt, however, that considerable progress toward a solution of this vexatious problem was made by the enactment on April 13, 1936, of legislation providing for the appointment by the President of a (quoting the act) "neutral committee of three members for the purpose of making an independent study and investigation of the rules for the measurement of vessels using the Panama Canal and the tolls that should be charged therefor, and hold hearings thereon, at which interested parties shall have full opportunity to present their views." This legislation also provides that the committee shall report to the President prior to January 1, 1937, "and shall make such advisory recommendations of changes and modifications of the 'Rules for the Measurement of Vessels for the Panama Canal' and the determination of tolls as it finds necessary or desirable to provide a practical, just, and equitable system of measuring such vessels and levying such tolls."

#### ORIGIN OF DUAL MEASUREMENT SYSTEM

Before the Panama Canal was completed, the President directed the Secretary of War to appoint a Special Commissioner on Panama Canal Traffic and Tolls to bring up to date the data on traffic and tolls contained in the report of the Isthmian Canal Commission (1899-1901), to formulate rules and regulations to govern the measurement of ships transiting the Canal, and to make an investigation and to submit recommendations regarding the tolls to be charged. Acting in pursuance of these directions, the Secretary of War on September 1, 1911, appointed as special commissioner, Dr. Emory R. Johnson, a recognized authority on commerce as well as on railway and water transportation. Dr. Johnson submitted two extensive reports on the subject; the first of which, a comprehensive report on traffic and tolls, was submitted on August 7, 1912. This report was furnished to Congress and testimony relating to its provisions was given in Congress before the committees then considering the bill providing for the operation of the Canal (the Panama Canal Act of Aug. 24, 1912).

The Panama Canal Act granted broad powers to the President with regard to the assessment of tolls and the rates to be charged. The act provided that:

Tolls may be based upon gross or net registered tonnage, displacement tonnage, or otherwise \* \* \*; may be lower upon vessels in ballast than upon vessels carrying passengers or cargo \* \* \*; when based upon net registered tonnage for ships of commerce the tolls shall not exceed \$1.25 per net registered ton nor be less than 75 cents per net registered ton; \* \* \* if the tolls shall not be based upon net registered tonnage they shall not exceed



the equivalent of \$1.25 per net registered ton as nearly as the same may be determined, nor be less than the equivalent of 75 cents per net registered ton.

Following the recommendations of the special commissioner, and pursuant to authority vested in him by the Panama Canal Act, President Taft, on November 13, 1912, issued a proclamation fixing the toll rate on vessels carrying passengers or cargo at \$1.20 per net vessel ton of 100 cubic feet of earning capacity, with a 40-percent reduction for vessels in ballast. At the same time the President directed the Secretary of War to prepare and prescribe such rules and regulations for the measurement of vessels as might be necessary and proper to carry the provisions of the proclamation into full force and effect.

During the following year (1913) the special commissioner on Panama Canal traffic and tolls presented his second report, "Measurement of Vessels for the Panama Canal", which reviewed and compared the measurement rules of all countries, including those in effect at the Suez Canal. In this report it was pointed out that none of the national measurement rules, either of the United States or of foreign countries, was framed with a view to making registered tonnage an accurate measure of the earning capacity of vessels; that if any one of these sets of rules were adopted to determine the tonnage upon which Panama Canal charges should be paid, the charges would not be fair and equable as among different types of ships, and that tolls would not be imposed as closely as was desirable in accordance with ability of vessels, by reason of their earning capacity, to pay the charges. In order that the Government might not be deprived of a portion of the revenues which it would be entitled to receive from vessels passing through the Canal on the basis of their earning capacity, it was essential that there should be adopted a set of measurement rules for the Panama Canal which should take into consideration the special elements affecting the situation at the Panama Canal. The purpose of the special commissioner, therefore, was to ascertain accurately the tonnage on which tolls should be paid at the Panama Canal. The measurement rules submitted by Dr. Johnson, special commissioner, were the result of extended study, research, and investigation, and a review of long experience elsewhere in the application of vessel measurement rules. The rules were especially designed to determine the earning capacity of vessels and have been pronounced the most exact application yet devised of the scientific principles which should govern the subject.

The measurement rules evolved by Dr. Johnson were placed in effect by means of President Wilson's proclamation of November 21, 1913, and upon the opening of the Panama Canal to commercial traffic in 1914, tolls were collected solely on the basis of the Panama Canal rules of measurement. Subsequently, however, upon a protest

of certain shipowners regarding tolls charged for cargo carried on deck, the question of the maximum tolls collectible under the law was referred to the Attorney General for an opinion. The conclusion of the Attorney General was that, in fixing the maximum and minimum rates of tolls, it must be presumed that Congress used the term "net registered tonnage" as same had been prescribed by statute, and the effect of this conclusion was that where the toll rate established at \$1.20 per ton, when multiplied by the tonnage ascertained by the Panama Canal Rules, exceeded the amount produced by multiplying the net registered tonnage as determined by the United States Rules of Measurement by \$1.25, the difference was uncollectible. The President thereupon issued instructions that, until Congress should deal more satisfactorily with the question, no tolls should be demanded or collected upon any vessel of commerce which should aggregate more than \$1.25 multiplied by the net registered tonnage as measured under the statutes of the United States. The result created thereby was that, whereas toll charges at the Panama Canal were based on one tonnage—the Panama Canal net tonnage—the limiting factor was that provided by a different and lower tonnage—the United States net tonnage. Thus it was required that all vessels be measured under both the Panama Canal and the United States rules of measurement and resulted in the establishment of a dual system of measurement at the Panama Canal. It is clear that no such result was intended by Congress.

#### EFFECT OF DUAL SYSTEM

The effect of the establishment of a dual system of measurement which followed the application of the instructions of the President issued in pursuance of the opinion of the Attorney General was not immediately apparent since, when the Panama Canal was first opened for traffic in August 1914, the United States measurement rules did not permit the exemption of shelter decks or superstructures, even though so-called tonnage openings be left in the enclosure. Soon thereafter, however, the Bureau of Navigation of the Department of Commerce issued a bulletin outlining the conditions under which such exemptions might thenceforth be secured. The regulations affecting United States measurement rules were also later modified so as to permit the exemption of large blocks of passenger cabins not formerly permitted to be exempted under the United States rules. Later still, double-bottom tanks were made exempt from measurement, regardless of their use. The result of these modifications and exemptions was to reduce materially the tonnage on which tolls of laden vessels could be assessed, and as a direct consequence there followed a greatly reduced volume of tolls charges for Canal transits.

After deducting the amount of tolls refunded on account of charges made in excess of \$1.25 per United States net registered ton, the average rate of tolls actually paid on laden vessels for the period ending December 31, 1914, was \$1.175 per Panama Canal net ton. It is, therefore, apparent that for this early period during which tolls were collected on laden vessels amounting to \$1,395,361, of which approximately \$6,900 was on account of deck loads, the United States net registered tonnage must have been at least 94.5 percent of the Panama Canal net tonnage. Through the years since 1914, the tonnage, under United States rules, of vessels using the Canal has been continuously reduced either by structural alterations in vessels to secure a reduction in tonnage or by taking full advantage of the modifications in the rules in the case of new construction, although the tonnage under Panama Canal rules, based on the actual earning capacity of the vessel, has not been decreased. It is to be remembered that since the United States net tonnage, under the present modification of the United States rules, is in nearly all cases lower than Panama Canal net tonnage, the practical result is that tolls on laden vessels are collected on the basis of the United States net tonnage times \$1.25, while the tolls on vessels in ballast are generally collected on the basis of the Panama Canal net tonnage times 72 cents. This creates a condition whereby vessels pay on one tonnage when laden and a different and higher tonnage when in ballast without passengers or cargo.

The following table indicates the extent to which this reduction in tonnage, which is directly reflected in a corresponding reduction in tolls charges, has been accomplished since 1917 (accurate figures for prior years are not available, but for the first 5 months of the Canal's operation the percentage may be stated as 94.5). This table shows the percentage that the aggregate United States net tonnage has formed of the aggregate Panama Canal net tonnage as applied to all vessels which have transited the Canal since 1917:

Fiscal year	Percentage of United States to Panama Canal tonnage <sup>1</sup>	Fiscal year	Percentage of United States to Panama Canal tonnage <sup>1</sup>
1917.....	81.08	1927.....	78.40
1918.....	82.74	1928.....	77.60
1919.....	84.78	1929.....	76.38
1920.....	82.95	1930.....	75.65
1921.....	81.86	1931.....	74.09
1922.....	80.59	1932.....	72.82
1923.....	80.44	1933.....	71.70
1924.....	80.14	1934.....	71.22
1925.....	79.31	1935.....	69.87
1926.....	78.51	1936.....	69.52

<sup>1</sup> Percentages shown in above table vary slightly from the figures contained in 1934 annual report because of the elimination from Panama Canal traffic statistics of all vessels of less than 300 net tons.

It is seen from the foregoing table that a United States net registered ton, as compared with a Panama Canal net ton, has decreased from 81.08 percent in 1917 to 69.52 percent in 1936. Tolls have decreased proportionately.

There is one class of vessels (tankers) to which the above average percentage of reduction is not applicable and for this reason it has been contended that the abolishment of the dual system of measurement would have the effect of transferring the tolls burden from oil tankers to general cargo vessels. The fact is that tankers as a class do not lend themselves to the tonnage reductions which have been allowed under United States rules and the percentage of United States net tonnage to Panama Canal net tonnage for tankers is therefore higher than that of other types of vessels. The following table shows the percentage which United States net tonnage bears to Panama Canal net tonnage for the years from 1920 to 1936. The figures used are those of the preceding table except that the tonnage of tanker traffic has been segregated.

Percentage of United States to Panama Canal net tonnage				Percentage of United States to Panama Canal net tonnage			
Fiscal year	Tankers	All other vessels	Total	Fiscal year	Tankers	All other vessels	Total
1920.....	84.3	82.8	82.9	1929.....	82.4	74.9	76.4
1921.....	86.8	81.8	81.9	1930.....	82.3	73.8	75.7
1922.....	85.2	80.2	80.6	1931.....	82.2	72.2	74.0
1923.....	85.2	78.5	80.4	1932.....	83.7	70.9	72.8
1924.....	83.9	77.8	80.1	1933.....	83.1	69.4	71.7
1925.....	83.9	77.5	79.3	1934.....	83.1	68.2	71.2
1926.....	82.9	77.0	78.5	1935.....	83.2	67.2	69.9
1927.....	82.3	76.8	78.4	1936.....	83.6	67.5	69.5
1928.....	81.5	76.6	77.6				

From the foregoing table it is seen that during the past 16 years the average tanker tonnage has been 83.2 percent of Panama Canal net tonnage and has ranged from a maximum of 86.8 in 1921 to a minimum of 81.5 in 1928. During the last 5 years it has been a little over 83 percent. For all other classes of vessels, the United States net registered tonnage, as compared with Panama Canal net tonnage, has steadily dropped from 82.8 percent in 1920 to 67.5 percent in 1936, a reduction of 15.3 percent in 17 years.

Tankers pay a proportionately higher rate per Panama Canal ton than vessels of other types, the average for 1936 being \$1.045 per Panama Canal net ton, when laden, as against an average of \$0.836 for general cargo and passenger-cargo vessels, and a general average of \$0.854 for all traffic.

Obviously, therefore, any reduction in the laden rate per Panama Canal ton below the \$1.045 now paid by the tanker group under the dual system will result in a reduction to that group which will not

apply to those types that have already secured a reduction by other means; that is, by a reduction in the tonnage on which their tolls are now assessed. In addition, because vessels of the tanker group necessarily pass through the Canal in ballast one way on each round trip voyage, any ballast rate less than 72 cents per Panama Canal ton will have a direct effect upon the amount of tolls collected as these vessels are now assessed on Panama Canal tonnage at 72 cents per ton when in ballast status.

Many vessels have not yet taken full advantage of the modifications of the United States measurement rules permitting exemption of cargo spaces of freight vessels. Particularly is this true of vessels of certain foreign nations. During 1934, for instance, the 84 vessels of one nationality, which made 258 transits of the Panama Canal, showed a Panama Canal net tonnage of 1,413,305—the United States net tonnage forming 80.2 percent of the Panama Canal tonnage. During 1935 the Panama Canal tonnage of the vessels of this same nationality was 1,483,609 tons—the United States tonnage dropping to 75.8 percent of the Panama Canal net tonnage, or a reduction from the 1934 figures of 5.5 percent in tons and tolls charges. In 1935 the Panama Canal tonnage of all vessels of this nationality showed an increase although the amount paid for tolls actually decreased.

To indicate the extent to which advantages are gained under the modification in the United States rules in the case of newly constructed vessels, 18 vessels of the same foreign nationality which had been newly constructed and which had taken full advantage of the various modifications which have been made in recent years to effect tonnage reductions, made 89 transits of the Canal during the year. For these 89 transits the United States net tonnage amounted to 370,382, while the corresponding Panama Canal net tonnage was 559,280. The tonnage under United States rules amounted to only 66.2 percent of the Panama Canal net tonnage. Especially noteworthy is the fact that in the case of one of the newest of such vessels to arrive at the Canal, the United States net tonnage of the vessel was 3,515, while the Panama Canal net tonnage was 6,323. The United States net tonnage thus amounts to only 55.6 percent of the Panama Canal tonnage and the vessel pays tolls amounting to \$4,393.75, a rate of 70.6 cents per ton under Panama Canal rules whether loaded or in ballast. In the case of this vessel, which uses the Canal regularly, the effect of the dual system is to reduce by the sum of \$3,193.85 the amount of tolls received from the vessel each time it transits the Canal.

The dual system, having no equity among the several types of vessels transiting the Canal, must be considered as a form of subsidy to certain types of vessels at the expense of other types. To

grant such a subsidy to certain types of American vessels is unsound in principle; granting it to foreign vessels is entirely indefensible. Yet foreign vessels have been the principal beneficiaries of the system in the past and will benefit in an even greater degree as fuller advantage is taken of the modifications in the rules as new vessels are constructed. It is important to note that all concessions and reductions secured by American vessels under modifications of the United States rules are necessarily extended in the same degree to foreign vessels by reason of treaty provisions which prescribe that there shall be no discrimination in respect to charges to vessels using the Canal.

In connection with the matter of the extent to which foreign flag vessels have benefited through the dual measurement system, it may be pointed out that in 1932 the United States Bureau of Efficiency made a complete survey of the tolls collections of the Canal. The report of the survey showed that in 1931, the last year for which figures were then available, the effect of the dual measurement system had been to decrease tolls charges approximately \$7,000,000 below those which would have been collected under Panama Canal rules. Of this sum \$4,000,000 represented the benefit to foreign flag vessels, and \$3,000,000 to American flag vessels.

In the 17-year period (1914-31), covered by the report of the Bureau of Efficiency, it was shown that the amount paid by vessels using the Canal was \$59,000,000 less under the dual measurement system than if Panama Canal measurement rules had been applied. Of this amount, foreign-flag vessels benefited by over \$32,000,000, while American vessels benefited to the extent of something less than \$27,000,000. During the whole 22 years of Canal operation (1914-36), vessels have paid \$92,000,000 less under the dual measurement system than would have been paid under Panama Canal measurement rules if the toll rates fixed in 1912 had continued to be collected. Of this amount foreign flag vessels benefited to the extent of approximately \$51,000,000, and American vessels in the sum of about \$41,000,000. Thus, for every dollar of benefit granted to American vessels, a benefit of more than one dollar has accrued to foreign flag vessels. During this period the tonnage of American vessels represented 44 percent of the total traffic and foreign vessels 56 percent. The report of the Bureau of Efficiency pointed out that if the dual system was to be continued on the theory that American shipping must be thus protected against any increase in tolls, it constituted one of the most costly forms of ship subsidy that could be devised.

The tolls paid by the various nationalities using the Canal during the fiscal year 1936 are shown in the following table. In this table

the payments for tolls are separately entered so as to show (1) general cargo vessels and cargo-passenger vessels, and (2) the total amount of tolls for all commercial traffic through the Canal, the latter figures including, in addition to the general cargo and cargo-passenger vessels, oil tankers, and miscellaneous non-cargo-carrying vessels such as yachts, foreign naval vessels, etc. There is also shown in the table the average amount per Panama Canal net ton of the tolls which were actually collected on laden and ballast traffic for the various nationalities.

Nationality	Tolls actually collected under present dual system		Tonnage						Prorata per Panama Canal net ton on tolls actually collected			
			General cargo and cargo/passenger			Total traffic			Laden		Ballast	
	General cargo and cargo/passenger	Total traffic	Panama Canal net		United States equivalent	Panama Canal net		United States equivalent	General cargo and cargo/passenger	Total traffic	General cargo and cargo/passenger	Total traffic
			Laden	Ballast		Laden	Ballast					
Belgian.....	\$5,358,367.25	\$22,048.00	5,275,890	1,121,483	783,238	12,650	12,650	10,352	\$0.863	10,352	\$1.023	10,352
British.....	64,871.25	6,131,523.66	67,981	1,121,483	783,238	5,781,879	1,446,626	1,057,369	.881	1,057,369	\$0.718	.718
Chilean.....	594,914.02	64,871.25	563,586	109,415	69,658	67,981	67,981	51,897	.954	51,897	.954	.954
Danish.....	510,060.52	594,914.02	563,586	109,415	69,658	563,038	129,090	86,053	.769	86,053	.785	.785
Danzig.....		17,217.09				7,796	12,147	6,777		6,777	1.087	1.087
Ecuadorian.....		300.96					418	395				
French.....	407,075.00	460,877.48	519,452			551,848	26,934	353,188	.784	353,188	.800	.800
German.....	1,023,387.09	1,038,071.44	1,200,878			1,236,453	7,252	842,280	.848	842,280	.852	.852
Greek.....	189,041.14	189,041.14	141,631	78,862	54,508	141,631	78,862	105,866	.934	105,866	.934	.934
Honduran.....	20,032.54	20,032.54	11,007	11,007	9,686	11,007	11,007	9,686	1.100	9,686	1.100	1.100
Hungarian.....	3,307.50	3,307.50	3,111			3,111		2,646				
Italian.....	238,041.25	259,757.26	321,574			339,005	4,833	205,022	.740	205,022	.756	.756
Japanese.....	1,479,731.33	1,479,731.33	1,552,945	54,969	43,580	1,552,945	54,969	43,580	.927	43,580	.927	.927
Netherlands.....	436,180.69	495,782.63	503,894	35,402	26,411	550,294	79,679	350,731	.815	350,731	.827	.827
Norwegian.....	1,579,410.87	2,079,501.09	1,795,038	287,558	205,502	2,146,813	475,476	362,094	.766	362,094	.810	.810
Panamanian.....	188,847.16	570,231.74	191,896	56,833	46,869	460,607	194,283	344,659	.773	344,659	.935	.935
Peruvian.....	7,395.00	7,395.00	6,560			6,560		5,916		5,916	1.127	1.127
Spanish.....	28,787.39	28,787.39	17,813	13,762	11,497	17,813	13,762	15,103	1.060	15,103	1.060	1.060
Swedish.....	477,015.39	488,038.29	451,569	151,997	119,913	457,879	157,717	301,711	.815	301,711	.818	.818
United States.....	8,162,113.64	9,437,141.50	9,666,683	240,831	219,689	10,470,846	852,594	7,062,974	.827	7,062,974	.842	.842
Venezuelan.....		1,131.40				2,162	2,162	2,116		2,116	1.200	1.200
Yugoslav.....	69,847.50	69,847.50	71,733			71,733		55,878	.974	55,878	.974	.974
Total.....	20,243,503.11	23,442,616.21	22,353,261	2,174,471	1,895,343	24,464,056	3,560,361	16,727,610	.836	16,727,610	.854	.854

NOTE.—Tolls collected on 14 ships paying on displacement tonnage (British, \$24.836; Finnish, \$1.645; German, \$9.296; and Mexican, \$721) are not included in above.



## THE PANAMA CANAL RULES

As has been stated above, the Panama Canal rules were designed so that the measurement of the vessel for tolls purposes would actually reflect the earning capacity of the vessel. These rules were patterned after but were an improvement upon those in use at the Suez Canal and were so devised as to prevent the very inequalities which have developed through the application of the dual system. The rules do not lend themselves to a manipulation of the tonnage, and the results obtained from the application of the Panama Canal measurement rules remain constant. The United States rules, however, permit of reductions in net tonnage through slight structural alterations and installations and through liberal application of the rules, all vessels, domestic and foreign, have been able continuously to reduce the net tonnage derived from the application of those rules. As has been shown above, the result of such changes in the rules has been that while the United States net tonnage of all vessels transiting the Canal aggregated nearly 94.5 percent in 1914 and in 1917 81.08 percent of the tonnage which would have resulted from the application of the Panama Canal measurement rules, that percentage has been steadily reduced until it reached its lowest point of 69.52 percent in 1936. This is a reduction of about 13 percent during the first 3 years and over 11 percent additional in the last 19 years; or a total reduction of approximately 24 percent. This percentage will grow progressively smaller as new vessels are constructed so as to take the fullest advantage of the modifications which have already been made and which may continue to be made in the future.

While the Panama Canal rules were designed to prevent the results which have followed from the establishment of a dual measurement system, it was not expected nor intended that they should remain forever unchanged. Express provision was made for their revision in such a manner as not to retard the natural development and improvement in vessel design or to penalize the making of more adequate provisions for the safety and comfort of the passengers and crew. Failure to make provision for the modification of the Panama Canal rules might well have had the effect of restricting or limiting the use of the Canal and to have reduced the tonnage of traffic through this waterway. Cognizance has been taken of the fact that specialization in ocean freight services have brought about important changes in the design of general cargo carriers. It is quite probable that such changes may suggest the advisability of some modification of the Panama Canal rules of measurement while at the same time adhering to the primary principle of the Panama Canal rules that tolls charges should be in direct ratio to the earning capacity of the vessel.

## CANAL COST AND TOLL RATES

If the Canal is to be operated and maintained on a self-sustaining basis it is essential that tolls, which constitute all but a negligible portion of the revenues of the Canal, should be established in relation to the capital cost of the Canal and the cost of its operation and maintenance.

It was not to be expected during the earlier years of the operation of the Canal that the limited amount of traffic at that time would completely reimburse the United States for the costs of operation, maintenance, interest, and provide a fund for the ultimate amortization of the capital investment in the Canal. With the increase in general world trade and the particular development of new trade routes which the Panama Canal has made possible, the traffic through the Canal has increased to the point that makes it not only possible but economically imperative to place the fiscal affairs of the Canal on a firm and justifiable footing.

The principle is now well recognized that the Panama Canal is not to be regarded as a public improvement from which no direct return is to be expected, but is to be considered and operated as a great utility of international character, constructed and maintained by the United States for the benefit of all nations upon the terms of equality prescribed by treaty, for which all commercial vessels using the Canal may be expected to pay tolls which are commensurate with the costs incurred in the construction, operation, and maintenance of the Canal.

During the last few years traffic through the Canal has increased to the point where it is practicable to accomplish the ultimate object of producing Canal revenues that will cover operating expenses, interest, and ultimate amortization of the investment, without imposing a burden upon the vessels using the Canal. It is felt, therefore, that tolls for the use of the Canal should be established at rates which will provide for reimbursing the Government for the cost of constructing, operating, and maintaining the Canal; and any plan which falls short of completely reimbursing the Government for these costs must be recognized as constituting a subsidy to the vessels using the Canal to the extent of the resulting deficit. The benefits of such a concealed subsidy, if the Canal is operated at a loss, will not accrue to American vessels alone, since foreign-flag vessels will partake of the subsidy in a considerably greater degree than American vessels.

The establishment of a dual system for the measurement of vessels, an eventuality which it is certain Congress could not have had in contemplation when it enacted the Panama Canal Act, and which resulted, as shown above, from an interpretation of the Panama Canal

Act which could not have been foreseen by Congress, has resulted in a continuous lowering of tolls and the revenue has continued to be insufficient to cover operating expenses and interest on the investment. The result has been that, from July 1, 1921, fixed as the date of the completion of the construction of the Canal, to the end of the fiscal year 1936, the revenue received has covered operating expenses, including depreciation of depreciable property amounting in capital value to about \$95,000,000, but has been about \$17,000,000 less than would be necessary to cover interest at the rate of 3 percent per annum paid by the United States on money borrowed to construct the Canal. This is an average deficit of about \$1,100,000 per year. The total deficit may be expected to increase during the next year or two unless there is a heavier increase in the volume of traffic than now seems probable. The revenue received has thus been insufficient to permit the setting up of any sum for the ultimate amortization of the investment in the Canal.

To have accomplished the amortization of the present investment in the Canal in 100 years from July 1, 1921, the date fixed as the end of the construction period, would have required the receipt each year over and above the average annual deficit of \$1,100,000, of additional revenue amounting to \$800,000 and the setting aside of that amount in a sinking fund to be increased by interest at the rate of 3 percent compounded annually. No amount, however, can be set aside for the amortization of the Canal investment until the deficit has been liquidated and sufficient revenues accrue annually to provide the funds required. If, as appears practicable with the expected increase in traffic and the establishment of measurement rules and of toll rates on a reasonable basis, the deficit can be liquidated in a few years, then amortization of the anticipated capital investment can be provided for within the 100-year operating period without imposing an undue burden upon shipping. The desired result of amortizing the investment can then be accomplished by the receipt of a relatively small annual return in addition to the amount sufficient to cover operating expenses and interest. Any amounts received in excess of such sums will be direct profits to the United States.

During the fiscal year 1936 the deficit between revenues and operating expenses, including interest on the investment but excluding any charge for amortization, amounted to the sum of \$947,000. By this sum the United States subsidized ships using the Canal during the fiscal year 1936. Foreign flag ships benefited most through this subsidy, as is shown in the following tabulation:

United States flag ships.....	\$381,000
Foreign flag ships (principally British, Norwegian, Japanese, and German)....	566,000
	<hr/> 947,000

A similar tabulation for the last 5 years shows the following:

United States flag ships-----	\$3, 548, 000
Foreign flag ships-----	4, 414, 000
	<hr/> 7, 962, 000

If a charge for amortization at the rate of \$800,000 per annum had been included for the 5-year period, the distribution of the deficit would have been as follows:

United States flag ships-----	\$5, 328, 000
Foreign flag ships-----	6, 634, 000
	<hr/> 11, 962, 000

#### RECOMMENDATIONS CONCERNING TOLLS AND MEASUREMENT RULES

The bases of the recommendations of the Canal administration as to measurement rules and rates of tolls may be summarized as follows:

(a) The establishment by authority of Congress of a single system of measurement, under rules of measurement to be prescribed by the President, which will apply equably to all vessels in accordance with their earning capacity;

(b) The operation and maintenance of the Panama Canal on a completely self-sustaining basis in accordance with recognized business practice; including adequate provision for the ultimate amortization of the capital cost of the Canal;

(c) The establishment by Congress of maximum and minimum rates of tolls per Panama Canal ton;

(d) The establishment by the President of actual rates per Panama Canal ton within the limits prescribed by Congress.

#### SUPERANNUATION DISABILITY PAY FOR NATIVE EMPLOYEES

Identical bills, S. 4682 and H. R. 4991, were introduced during the first session of the 74th Congress. This proposed legislation would authorize the Governor, under regulations to be prescribed by the President, to pay cash relief to such native or tropical employees of the Panama Canal as may become unfit for further useful service by reason of mental or physical disability resulting from age or disease. It is provided that such cash relief shall not exceed \$1 per month for each year of service of the employee concerned, with a maximum payment of \$25 per month. To be entitled to superannuation relief, the employee would be required to have had at least 10 years of service with the Panama Canal or Panama Railroad Co. on the Isthmus of Panama.

American citizens employed by the Panama Canal or Panama Railroad Co. are eligible to retirement under the Panama Canal Retirement Act, but this covers only employees who are citizens of

the United States. A large proportion of the Canal and railroad forces are natives of Panama or of countries adjacent to the Caribbean Sea, and they are without benefit of provisions of law for retirement when, through superannuation or other disability, they can no longer perform their work. The need increases for providing a small measure of relief for the many native and tropical employees who have grown old and infirm in the service of the Panama Canal. The Panama Railroad Co. has for some years given to such of its native employees pensions ranging from \$7 to \$25 per month, but there is no authority to grant such benefits to employees of the Panama Canal. Nothing more can be done for them except to offer them care at Corozal Hospital, where there are no accommodations for their families, or to continue to carry them on the rolls at reduced rates of pay. The average earnings of the able-bodied workers of this class who are employed by the Canal approximates \$55 per month at the present time. During the construction of the Canal many of these native workers were employed at the rate of 10 cents an hour. Some of them have been employed by the Panama Canal for from 25 to 30 years or more and a number of them should now be replaced by younger and more efficient men. Efforts have been made to employ them on light work at rates of pay ranging from \$15 to \$25 per month, but it would be much more economical to grant these employees a small annuity and to move them away from the Isthmus.

The cost of caring for these employees on the basis of an average pension of \$20 per month has been estimated at \$12,000 for the first year, with a gradual increase to a maximum of \$121,000 a year for the twentieth year and each year thereafter. This cost is not high, considering the number of employees concerned, and the relief recommended is considered not only humane but a step toward more efficient operation.

After hearings thereon, the bill was favorably reported to the House on March 4, 1936. No action was taken by the Committee on Interoceanic Canals, to which the bill was referred in the Senate, and the bill remained unenacted when Congress adjourned. The proposed legislation had the endorsement of the President and the Secretary of War, and it is hoped that it may be enacted by the new Congress.

#### APPOINTMENT OF CANAL ZONE YOUTHS TO THE NAVAL ACADEMY

H. R. 12199, to provide for the appointment of four midshipmen from the Canal Zone to the Naval Academy, was introduced in the House on April 7, 1936, and referred to the Committee on Naval Affairs. During the preliminary discussions of this bill it was understood that it would be reported with provision for the appointment

of one midshipman only from the Canal Zone. Because of the press of more important legislation at the close of the session, the bill failed of consideration and was not reported. It is hoped that a similar bill may be introduced and enacted by the coming Congress since it is believed that the youth of the Canal Zone should have an opportunity to qualify for appointment to the Naval Academy.

#### GENERAL LEGISLATIVE MATTERS PERTAINING TO THE CANAL-RAILROAD ORGANIZATION

House bill 6719, to amend the Canal Zone Code, was introduced in the House during the first session of the Seventy-fourth Congress. The bill provided for some 14 amendments to the Canal Zone Code, the general purpose of which was to remedy minor defects which had been discovered in the code since its adoption on June 19, 1934, and to make applicable to the Canal Zone certain portions of general legislation enacted for the United States during the last 2 years. The bill, which had been passed by the House during the first session of the Seventy-fourth Congress, was passed by the Senate in June 1936, with an amendment eliminating section 2 of the bill which provided for an amendment to existing legislation confirming the authority of the President to establish regulations governing conditions of employment for employees of the Panama Canal. The legislation was approved on June 24, 1936, and became effective immediately.

Senate Joint Resolution No. 86, authorizing the Governor to investigate the means of increasing the capacity of the Panama Canal for future needs of interoceanic shipping, and to prepare designs and approximate estimates of cost of such additional locks or other structures as are needed for the purpose, was approved on May 1, 1936.

House Resolution No. 126, transferring consideration of legislation affecting the Panama Canal from the Committee on Interstate and Foreign Commerce to the Committee on Merchant Marine and Fisheries, was adopted on February 26, 1935.

House Joint Resolution No. 247, introduced in the House on April 16, 1935, provided for the disposal of certain lands held by the Panama Railroad Co. on Manzanillo Island, Republic of Panama, which were no longer needed by the Canal enterprise. At the close of the Seventy-fourth Congress this resolution remained in the Committee on Merchant Marine and Fisheries, to which it had been referred. It will be recommended that this measure be again introduced in the Seventy-fifth Congress.

Senate bill 2743, which had been introduced during the first session of the Seventy-fourth Congress, authorizing the erection of a suitable memorial to Major General Goethals within the Canal Zone, was approved on August 24, 1935.

Senate bill 1819, House bills 2745 and 5590, providing for the extensive replacement of native artisans, helpers, and employees in the lower grades by citizens of the United States, were introduced in the first session of the Seventy-fourth Congress and no action had been taken thereon when Congress adjourned on June 20.

#### CAPITAL ALLOTMENTS, FISCAL YEAR 1937

The appropriation for 1937 carried \$2,673,802 for replacement of worn-out or excessively deteriorated facilities, to which has been added \$661,452, representing the net unexpended balance to cover uncompleted projects carried forward from 1936, making a total of \$3,335,254 available for capital expenditures in the fiscal year 1937, which has been allotted as follows:

Dredging division station, Gamboa-----	\$961,708
Quarters for American employees-----	369,675
Dock no. 15, Balboa-----	703,950
Magistrate court, Balboa-----	60,500
Post office, Balboa-----	100,000
Motor transportation, shops, and stables-----	275,000
Police station, Gatun-----	37,500
Diablo Road, Balboa-----	66,226
Paint and carpenter shop, Gatun locks-----	20,000
Nurses quarters, Corozal-----	30,000
Club houses, Ancon and Cristobal-----	84,058
Oxy-acetylene plant, Balboa-----	34,730
Feeder line, Fort Sherman-----	31,482
Substation, Fort Sherman-----	14,544
Madden Dam project-----	156,000
Diesel lines to piers-----	180,000
Quarters for locks' military guard-----	72,589
Ward building, Palo Seco-----	23,286
Storage building for locks' overhaul equipment-----	38,274
Towing locomotive-----	38,912
Miscellaneous-----	36,820
Total-----	3,335,254

#### EXPLANATION OF FOREGOING ITEMS

*Dredging division station, Gamboa.*—The headquarters of the dredging division is at present located at Paraiso, which is at the south end of Gaillard Cut about 8 miles from the Pacific terminus of the Canal. This establishment is being moved to Gamboa, the junction of the Chagres River and the Canal. This location provides a more ample roadstead for floating equipment, and lies on the lake side of Gaillard Cut, which would afford direct access to unlimited dumping grounds in case of a major slide in the cut.

*Quarters for American employees.*—The amount allotted for 1937 and the sums to be requested in the succeeding years are urgently needed to continue the replacement of old and dilapidated frame buildings which were constructed either by the French Canal Co. or during the earliest days of American occupation of the Canal Zone. The program outlined by the Canal administration calls for \$500,000 for replacement of old quarters each year, although \$600,000 or \$700,000 annually would produce greater economy in the end. At

\$500,000 per year it will take about 9 years to replace the present old quarters. (The need for replacing a number of the old quarters now in use is set forth in detail on pp. 61 and 62.)

*Dock No. 15, Balboa, reconstruction.*—This dock replaces old dock no. 15, which was constructed in 1911 to handle the west coast lumber shipments during Canal construction, as well as to form a part of the permanent system of wharves in the Pacific port. The replacement has become necessary due to the development of a gradual earth movement. This movement has cracked the majority of the caissons and weakened the dock to the extent that it was no longer considered safe for dock loads. Consequently, the mooring of vessels thereto was prohibited.

*Magistrate court, Balboa.*—The magistrate's court is at present housed in an old dilapidated frame building which is unsafe and unsuitable, having been removed from the former construction town of Empire and reerected at Balboa in 1915. The new building will be approximately 35 by 112 feet, of reinforced concrete, tile roof and floors, and will be adjacent to the new police station at Balboa.

*Post office, Balboa.*—The new post-office building at Balboa is to replace an old frame building originally erected in the former construction town of Gorgona in 1907. Termites have attacked the stringers, floors, and beams, and the building is not worth the excessive cost of repairs necessary for its continued use. The new structure is to be of concrete, approximately 100 by 60 feet, with a 40-foot L, one-story, tile roof.

*Motor transportation shops and stables.*—The new structures, which are to include modern garage shops, storage sheds, tanks and gasoline-handling equipment, scrap yard, stables, service connections, roadways, fencing, etc., are to replace structures which were gradually converted from an animal corral built during Canal construction. When originally constructed the corral was well beyond the nearest residential area, but the site is now surrounded by family quarters, and is on the main thoroughfare between the Ancon and Balboa districts. The area is unduly congested, as well as being unsightly and odorous, and is hampered by narrow entrances. It has long been recognized that the present location is unsuitable, and a site in the new industrial area across the Panama Railroad tracks has been selected for this unit. Removal has been delayed in order to exhaust the remaining usefulness of the existing structures, but plant deterioration has now reached a point where removal cannot longer be economically postponed.

*Police station, Gatun.*—The new building is to be one story and of concrete, 24 by 84 feet, with tile roof, and with an extension 22 by 24 feet, comprising office room, jail, and quarters for policemen. It



will replace the present frame structure erected in 1907. Termites have attacked the woodwork and maintenance costs are excessive, while the fire hazard makes the building unsuitable for jail purposes.

*Diablo Road, Balboa, reconstruction.*—A new section of road 6,500 feet long and 20 feet wide is to be built; this will be done over the present road except where realignment is necessary. Diablo Road carries all truck and passenger traffic from Balboa docks, shops, and storehouse to the junction of Gaillard Highway at Diablo crossing leading to the Army posts at Corozal and Fort Clayton, and on to Pedro Miguel, Gamboa, and Madden Dam. The road is narrow, crooked, and in very poor condition, requiring excessive repairs.

*Paint and carpenter shop, Gatun Locks.*—A new concrete building, to house both the carpenter and paint activities, is to be erected at the location of the present paint shop. This will be approximately 75 by 46 feet. The present carpenter shop is located in the center wall-drop section which is unsuitable due to the necessity for double handling of material and refuse, and lack of storage space. The paint shop, a temporary frame structure, is located on the east wall, middle level, and is in very poor condition.

*Nurses' quarters, Corozal.*—A two-story concrete building, with tile roof, is proposed at Corozal Hospital. It will accommodate eight nurses and provide suitable facilities to place it on a standard with dormitories provided at other hospitals on the Canal Zone and in the United States. The present quarters are of frame construction, in very poor condition, and have no suitable segregation of sleeping space for nurses on night duty.

*Clubhouses, Ancon and Cristobal.*—As a result of one of the concessions granted to Panama by the President of the United States in 1933, existing contracts with outside interests for the operation of restaurants were canceled, and restaurant operations taken over by the Panama Canal in order to enforce strict limitation of patronage to employee personnel. The expenditure involves the cost of consolidating the restaurants with clubhouse activities, and building an annex to the restaurant at Cristobal to house the assembly hall, moving picture, and other clubhouse activities.

*Oxy-acetylene plant, Balboa.*—This proposed structure will be erected to replace the present plant located between the boiler shop and the plate-storage shed. It will be erected in an isolated part of the Balboa industrial area, thereby providing the greatest possible fire and explosion safeguards within the new plant.

*Feeder line and substation, Fort Sherman.*—This new electric feeder line and transformer substation are to be installed to take care of the additional load which became necessary with the replacement at Fort Sherman of the coal-burning ranges and water-heating equipment by electrical equipment. The existing electric cable was

installed at Fort Sherman several years ago to serve only the ordinary electrical requirements anticipated at that time.

*Madden Dam.*—The amount allotted for this project in 1937 is for grouting, electrical and municipal installations, tests, and surveys.

*Diesel lines to piers.*—It is proposed to connect pier no. 18, Balboa, with a 12-inch Diesel supply line, and to provide an 8-inch belt line around the pier, including connection with the pumping plant to tank 102. This installation is considered advisable because, at the present time, vessels docking at pier no. 18, where all cargo handling is concentrated, must be shifted to the oil dock should they require fuel. This condition results in considerable delay and additional expense to Diesel vessels. At the Atlantic terminus of the Canal, it is proposed to install an additional 10-inch Diesel line from the manifold at Mount Hope to piers nos. 7 and 8, with necessary connections and valves. This installation is deemed necessary owing to the increasing demand for light Diesel oil for bunkering which, coupled with the regular demand for heavy Diesel oil, requires the handling of two distinct grades through the existing pipe-line system.

*Quarters for locks military guards.*—The new quarters are to consist of elevated structures of frame construction and galvanized roofs to replace present facilities consisting of screened frames with wooden floors, supporting standard Army tents.

*Ward building, Palo Seco.*—The proposed new ward building is to be built as an additional unit to the existing facilities which are overcrowded.

*Storage for locks overhaul equipment.*—This structure is to be built to provide storage space for overhaul material, tools, and spare parts.

*Towing locomotive.*—The addition of this towing locomotive will assist in speeding transits of vessels through the Canal during periods of traffic congestion. This item was included in the 1934 and 1935 reports but work was not completed.

#### GENERAL PROGRAM

In anticipation of future needs, in 1931, the Canal administration prepared a program of work to be carried on during the next 10 or 15 years.

A 6-year program as submitted this year to the Federal Employment Stabilization Office of the Treasury Department, called for a total capital expenditure of \$18,000,000 from 1938 to 1943. This program was carefully considered and represented the best thought and judgment that could be brought to bear on the future appropriation needs of the Canal organization.

The value of adopting and adhering to a definitely planned program of replacements and betterments lies in the fact that very appreciable savings frequently can be effected in the purchase of materials, recruiting and employment of personnel, and in coordinating the program for replacements and betterments with the regular activities of the Canal organization.

#### ADDITIONAL NEEDS

As stated above, lists have been prepared of needed additions and replacements over a period of years and approximate estimates have been made of the costs. Obtaining funds for this work is one of the most important problems of the Panama Canal. For the construction of the Canal and its many auxiliaries, temporary, inexpensive wooden structures were built to house the shops and other parts of the construction plant, the employees and many of the public-utility and governmental functions, and many of these continued to be used in the interest of economy for housing the operating plant and personnel after construction was completed. Because of the destructive effects of the elements and of the insects in this locality, the economical life of such structures is relatively short. The plan is to replace these with structures of longer life, and at the same time increase their capacity where justified, as funds are obtained. The undertaking is so extensive that many of these old structures are being maintained at excessive cost, and this uneconomical procedure will continue and become progressively worse at an accelerated rate unless funds for the purpose can be made available for replacements during the next 5 or 10 years. The most economical method of effecting replacements would be to allocate a definite sum to be used for this purpose each year as this would permit coordinating the replacement program with the regular activities of the Canal organization.

#### UNEMPLOYMENT

Conditions on the Isthmus, outside of the Canal Zone, have improved somewhat in the past year, but there is still a great deal of unemployment. The tropical population increases at a rate perhaps adjustable to a primitive or agricultural situation but too fast for the present stage of development of manufactures and other industries in the cities of Panama and Colon, adjacent to the Canal Zone, and for the almost stationary labor needs of the Canal and its adjuncts. The American population also increases more rapidly than the opportunities for employment.

In this field of oversupply of labor material, in both American and tropical residents, the division of personnel administration is assisting in the selection of the best of the material for employment

and in encouraging and directing the training of undeveloped material into persons capable of effective service.

### INCREASING THE CAPACITY OF THE PANAMA CANAL

The capacity of the Canal has been discussed in the annual report for 1931. During the past 5 years there has been a steady development of factors requiring special consideration so that assurance may be had that there will be continued, uninterrupted, safe, rapid, and economical transit of ships through the Canal in times of peace and war.

There has been a steady growth of traffic through the Canal since its completion and it is probable that studies, themselves extending over several years, will show that economy and orderly procedure prompt the extension over about 10 years of the construction of the necessary additional facilities. Authority to start the investigations in the immediate future was requested and authorized by House Joint Resolution No. 412, approved May 1, 1936. The purpose of the legislation was to permit the investigation of the time when the capacity of the present Panama Canal should be increased for future needs of interoceanic shipping, what additional facilities should be provided and where they should be located and to prepare one or more feasible plans together with estimate of cost.

Some surveys, borings, and geological investigations will be required before final decision is reached as to the correct locations for structures. Added spillway facilities for the convenient disposal of flood waters will be considered. The preliminary studies will probably extend over several years.

### VISIT OF PRESIDENT ROOSEVELT

President Franklin D. Roosevelt visited the Canal Zone on October 16, 1935, aboard the cruiser *Houston* of the United States Navy, with the U. S. S. *Portland* acting as convoy. The President came ashore at the dock in Balboa, where he was greeted by the Governor and a number of invited guests, including the President of Panama, Dr. Harmodio Arias, and Mrs. Arias. Accompanied by President and Mrs. Arias, Governor Schley and invited guests, the President was then escorted on an automobile tour of the Pacific side, leaving by way of Gaillard Highway for a visit to Madden Dam. They returned via Fort Clayton, where a review of the Pacific sector troops was held, followed by a luncheon at the officers' club. Afterwards the Presidential party and guests went to the Pedro Miguel locks, and boarded the *Houston* which cleared the locks northbound at 2:12 p. m. The cruiser arrived in Cristobal harbor at 6:30 p. m., and departed at 7:50 a. m. for the San Blas Islands.

## SECTION IV

### GOVERNMENT

The civil government of the Canal Zone is conducted as prescribed in the Panama Canal Act of August 24, 1912, and other acts and Executive orders made applicable to the Canal Zone. Whenever it has been practicable to assign governmental functions to departments in the organization established for the operation and maintenance of the Canal, this has been done. Complete cooperation and greater economy and efficiency are derived from such coordination of functions.

Data on the expense and revenues of various features of the Canal operation and government are shown in the financial and statistical statements in section V of this report.

### AREA OF THE CANAL ZONE

The total area of the Canal Zone and the areas segregated for various purposes, as of June 30, 1936, are shown herewith:

	<i>Square miles</i>
Total area of the Canal Zone.....	552.80
Land area of Canal Zone.....	361.86
Water area of Canal Zone (inclusive of Madden Lake to + 260-foot contour).....	190.94
	<hr/> 552.80
Land areas—Military and naval reservations (inclusive of revo- cable-license areas):	
Military reservations.....	51.33
Naval reservations.....	7.51
	<hr/> 58.84
Land areas, Canal Zone town sites (exclusive of Army and Navy posts) ..	11.94
Barro Colorado Island.....	5.71
Cemeteries.....	.12
Forest reserve.....	5.47
Swamps.....	16.50
Farms, cattle pastures.....	77.70
Usable land.....	185.58

### POPULATION

A house-to-house canvass of the civil population of the Canal Zone, including employees of the Army and members of families of Army and Navy personnel, omitting only commissioned, warrant, and enlisted personnel, was made by the police force during the month of June 1936. A summary is presented as follows:

District	Americans			All others			Total
	Men	Women	Children	Men	Women	Children	
Balboa.....	2, 142	2, 341	2, 065	3, 479	2, 244	5, 312	17, 583
Cristobal.....	517	630	712	3, 044	1, 927	4, 679	11, 509
Prisoners.....	10			87	1		98
Total.....	2, 669	2, 971	2, 777	6, 610	4, 172	9, 991	29, 190

A large number of employees of the Panama Canal and the Panama Railroad on the Atlantic side live in United States Government quarters in New Cristobal, which is in the Republic of Panama. Consequently they are not included in the above tabulation.

The foregoing total indicates a decrease of 446 as compared with the 29,636 population reported in June 1935. Corresponding figures for earlier years are: 1931, 30,745; 1932, 30,980; 1933, 31,839; and 1934, 29,964. Of the 29,190 civil population living in the Canal Zone in June 1936, a total of 7,315 were employed by the Panama Canal and Panama Railroad Co.; of these, 2,589 were Americans and 4,726 were aliens. Approximately 700 American and 4,800 alien employees live outside the Canal Zone.

#### PUBLIC HEALTH

General health conditions in the Canal Zone and in the two terminal cities of Panama and Colon continued to be favorable during the past year. No epidemics of diseases have occurred.

The members of the Army Medical Research Board proceeded throughout the year with their valuable research work, especially on malaria, in cooperation with the health department.

#### VITAL STATISTICS

The morbidity and mortality rates from diseases and injuries, and other vital statistics relating to the populations of the Canal Zone and the cities of Panama and Colon, are set forth in detail in the calendar-year report of the health department, which is published annually in pamphlet form. For this reason most of the tables are omitted from this report and the discussion of vital statistics is limited to a brief résumé of death rates, birth rates, and infant mortality rates.

*General death rate.*—The death rate from all causes in 1935 for the population residing in the Canal Zone was 5.89 per 1,000 of the population, which is the lowest on record; for Panama City the rate was 12.61 per 1,000; for Colon the rate was 12.90. The death rates by yearly periods for the past 5 years are shown in the following table:

*Death rates per 1,000 of population—all causes*

	1931	1932	1933	1934	1935
Canal Zone.....	7.52	7.30	7.12	6.43	5.89
Panama City.....	17.64	15.90	14.95	12.70	12.61
Colon.....	16.07	14.43	16.27	14.83	12.90

*Birth rates, including stillborn.*—The birth rate for the population residing in the Canal Zone for 1935 was 11.71 per 1,000 population, a slight decrease over 1934. The following table shows the total, live birth, and stillbirth rates for the population residing in the Canal Zone, covering the past 5 years:

*Rate per 1,000 population*

	1931	1932	1933	1934	1935
Live births.....	11.83	11.38	10.78	10.80	11.35
Stillbirths.....	.86	.31	.40	.68	.36
Total.....	12.69	11.69	11.18	11.48	11.71

The birth rate for Panama City was 31.88 per 1,000 population, as compared with 31.66 for 1934 and 33.00 for 1933. The birth rate for Colon was 30.83, as compared with 30.53 for 1934 and 28.37 for 1933.

*Death rates among children under 1 year of age.*—The following table shows the infant-mortality rates, by yearly periods, from 1931 to 1935:

*Deaths of infants under 1 year, per 1,000 live births*

	1931	1932	1933	1934	1935
Canal Zone:					
White.....	28	20	34	49	32
Colored.....	96	93	101	66	59
Combined.....	71	71	76	60	50
Panama.....	142	129	118	112	90
Colon.....	109	69	115	124	76

*Principal causes of death.*—The principal causes of death in each of the three groups of the population were as follows:

*Number of deaths and annual rate per 1,000 population, 1935*

	Canal Zone		Panama		Colon	
	Number	Rate per 1,000	Number	Rate per 1,000	Number	Rate per 1,000
Organic diseases of the heart.....	29	0.52	79	0.99	40	1.33
Cancer (various organs).....	27	.64	43	.54	24	.80
Tuberculosis (various organs).....	19	.45	190	2.38	64	2.13
Pneumonia (broncho and lobar).....	15	.36	113	1.41	41	1.37
Diseases of the arteries.....	12	.29				
Nephritis (acute and chronic).....	11	.26	60	.75	26	.87
Apoplexy.....					25	.83
Diarrhea and enteritis, including colitis.....			87	1.09		

## MALARIA

The rate for malaria showed improvement over that of the preceding year, as indicated in the following table:

*Malaria rates per 1,000 employees during the past 10 calendar years*

Year	Rate	Year	Rate
1926.....	14	1931.....	19
1927.....	11	1932.....	14
1928.....	14	1933.....	27
1929.....	21	1934.....	16
1930.....	26	1935.....	15

## HOSPITALS AND DISPENSARIES

The number of patient-days in Panama Canal hospitals for the past 3 calendar years has been as follows:

	1933	1934	1935
Gorgas Hospital.....	149, 292	136, 670	157, 224
Corozal Hospital:			
Insane.....	172, 413	61, 787	67, 473
Cripples and chronic medical and surgical cases.....	33, 696	39, 822	42, 346
Colon Hospital.....	31, 378	29, 875	30, 891
Palo Seco leper colony.....	34, 422	39, 185	38, 691
Total.....	421, 201	306, 839	336, 625

The reduction in patient-days at Corozal Hospital was due to the transfer in July 1933 of 600 insane patients undergoing treatment at the expense of the Republic of Panama to the new asylum operated by the Panamanian Government at Retiro Matias Hernandez.

## QUARANTINE AND IMMIGRATION SERVICE

Inspection was made of 6,523 vessels and 470 airplanes during the year, as compared with 6,348 vessels and 586 airplanes during the preceding year; 158 vessels availed themselves of the "special demand" night boarding service, as compared with 171 last year.

During the year no vessel was held in quarantine, but 1,246 persons were detained for immigration purposes, and 929 persons were deported for violation of the immigration regulations.

The persistence of smallpox, bubonic plague, typhus, and yellow fever in certain Latin American countries has necessitated the exercise of constant vigilance on the part of the quarantine division to prevent the entrance of infectious diseases, including the continuous observance of certain precautionary measures designed to prevent the departure of rats from vessels in port, and, where indicated, the fumigation of ships or discharge of cargo, or both, paying special attention to vessels from plague-infected territory.



The activities of the quarantine division during the fiscal year 1935 are summarized in the following table:

Vessels inspected and passed.....	6,298
Vessels granted pratique by radio.....	225
Total.....	6, 523
Crew passed at quarantine.....	369, 948
Crew passed by radio.....	68, 340
Passengers passed at quarantine.....	141, 768
Passengers passed by radio.....	4, 322
Total .....	584, 378
Airplanes inspected and passed.....	470
Crew of airplanes inspected and passed.....	1, 564
Passengers of airplanes inspected and passed.....	2, 377
Total .....	3, 941
Vessels detained in quarantine.....	2
Crew detained on board ship for quarantine.....	96
Immigration cases admitted to station.....	1, 246
Number of detention days.....	6, 081
Persons held for investigation and released.....	190
Persons deported under immigration laws.....	929
Supplementary inspection of vessels.....	4,047
Vessels fumigated.....	67
Box cars fumigated.....	253
Number of "special demand" night boardings.....	158

### MUNICIPAL ENGINEERING

The municipal division has charge of the construction and maintenance of roads, streets, and sidewalks and the water and sewer systems in the Canal Zone. Furnishing of water and the maintenance of the water and sewer systems and streets in the cities of Panama and Colon were also handled by the division. Construction work was performed for departments and divisions of the Panama Canal, the Army and Navy, and for individuals and companies.

The organization of the municipal division is divided into three main sections, viz, the southern district, including all points in the Canal Zone south of Darien, and the city of Panama; the northern district, including all points in the Canal Zone north of Darien, and the city of Colon; and the section of water purification and laboratories, including the operation of purification plants, laboratories, and reservoirs. In addition to these main sections, the two subdivisions established during the previous fiscal year were continued, the one at Gamboa covering the municipal work in connection with the construction of Gamboa townsite, and the other at Madden Dam cov-

ering the repair and reconstruction of redesigned sluiceways, completion of clay grouting, cooling and grouting of the main dam, and miscellaneous other work in connection with the dam. A third subdivision was established during the present fiscal year, to handle the work of demolition and reconstruction of dock 15, Balboa.

#### WATER SUPPLY

Consumption of water for municipal uses during the past 3 years has been as follows:

	1934	1935	1936
	<i>Gallons</i>	<i>Gallons</i>	<i>Gallons</i>
Canal Zone.....	3,040,224,000	3,054,712,300	3,202,190,880
City of Panama.....	1,400,882,000	1,498,282,000	1,530,562,000
City of Colon.....	745,340,000	800,360,000	839,967,000
Sales to vessels.....	169,787,000	174,095,700	185,169,620
Total.....	5,356,233,000	5,527,450,000	5,757,889,500

The following statement shows the quantity of water pumped at each of the pumping stations during the year, the average per month, and the cost of pumping per thousand gallons:

Pumping station	Total gallons pumped during year	Average gallons per month	Average cost per 1,000 gallons for pumping
Gamboa, U. S. no. 1.....	3,704,335,000	308,695,000	0.0186
Miraflores, U. S. no. 2.....	591,275,000	49,273,000	.0224
Balboa, U. S. no. 3.....	2,597,588,000	216,446,000	.0169
Paraiso.....	51,417,000	4,285,000	.0686
Mount Hope.....	1,893,462,000	157,788,500	.0219
Agua Clara.....	366,301,000	30,525,000	.0695
Monte Lirio.....	1,316,500	109,700	.8070
Frijoles.....	4,198,000	349,800	.2813
Total.....	9,209,892,500	767,472,000	-----

The usual maintenance work was performed on pipe lines, reservoirs, filtration plants and pumping stations during the year. All pumps are electrically driven, except at Frijoles and Monte Lirio, which are run by gasoline engines. Monte Lirio and Frijoles also have auxiliary windmills, which operate whenever there is sufficient wind movement.

In addition to regular maintenance, work was performed on the following special projects: Repair of mixing chambers and settling basins, Miraflores filtration plant; repair of main floor and alum distribution box at head house and walls and coping of filters, Miraflores filtration plant; installation of venturi and compound meters to determine water consumption in Old Cristobal, France Field, coaling plant, and Mount Hope tank farm areas; and completion of repairs to broken water main under the Canal at Balboa.

## SEWER SYSTEMS

In addition to the usual maintenance work on the sewer system, the following special projects were carried out during the year: Extension of storm drains and sanitary sewers through new athletic field, Red Tank; renew hydraulic valve, New Cristobal sewage pumping station; and construction of storm sewer near silver commissary, Mount Hope.

## ROADS, STREETS, AND SIDEWALKS, CANAL ZONE

In addition to the usual maintenance work performed on the roads, streets and sidewalks, the following special projects were carried out during the year:

*Reconstruction of Randolph Road.*—A section of Randolph Road extending from Diversion Road to Whitlock Street was repaved, and a section from Whitlock Street intersection to Bolivar Highway intersection was widened and rebuilt. This new road, which is 4,557 feet in length, was built to conform to the latest standard specifications for highway construction and involved the mixing and placing of 2,529 cubic yards of concrete.

*Relocation and reconstruction of Bolivar Highway.*—The section of Bolivar Highway between the oil-handling plant and Eastern Diversion crossing, consisting of 1,294 feet of road was rebuilt along a new alinement which eliminated several sharp curves and improved the gradient. The section of the highway between the end of pavement built during 1933 and the intersection of Diversion Road, a distance of 5,652 feet, was paved along a new course to eliminate sharp curves. All concrete was made with calcium chloride as an internal cure, and was built to conform to the latest standard specifications for highway construction. A total of 3,280 cubic yards of concrete was mixed and placed in connection with the paving work on Bolivar Highway, intersection, and necessary culverts.

*Widening of Fourth of July Avenue.*—Fourth of July Avenue, one of the most congested arteries in the Canal Zone, located along the boundary line between the Canal Zone and the Republic of Panama and serving not only a large part of Canal Zone traffic but also a great deal of Panama City traffic, was increased in width from 20 to 27 feet for a distance of six-tenths of a mile between Balboa Road and Gorgas Road. The new paving was of reinforced concrete, with standard curb and 4-foot wide concrete sidewalk, and involved the mixing and placing of 2,910 square yards of concrete street paving, together with the necessary sidewalk and curbing.

*Construction of Corozal cut-off road.*—As reported in the 1935 annual report, excavation, filling, and construction of culverts were

completed during the fiscal year 1935, in connection with the construction of a new section of road to replace that portion of Gaillard Highway passing through the Army post at Corozal. The concrete pavement for this section was laid during this fiscal year, extending a distance of nine-tenths of a mile, together with sidewalk to provide for pedestrian traffic. The new road bypasses the Army post at Corozal and eliminates the previously existing dangerous traffic condition caused by the heavy traffic from the motor pool and other military activities on the post flowing into the main highway.

#### GAMBOA PROJECT

The development of the new town of Gamboa, the municipal work for which was begun during the previous fiscal year, was continued during this year. The new town, while intended primarily for the forces of the dredging division, will also provide homes for employees of the lighthouse subdivision and such other employees as may be required as doctors, policemen, and firemen. The work accomplished during the year included: Extension of the sewer disposal main outfall, involving the laying of 2,400 feet of sewer pipe; excavation of 195,000 cubic yards of earth; installation of sewer connection for 26 gold families, 2 gold-bachelor buildings, 9 silver 12-family apartment buildings, and 1 silver-bachelor building. At the close of the fiscal year all heavy grading was completed and more than 3 miles each of sanitary sewer mains and water-distribution mains were installed, representing 90 percent of the requirement for sewer and water mains.

In connection with the removal of the dredging-division headquarters from Paraiso to the new town of Gamboa, it was necessary to construct a concrete wharf on the shore of Gatun Lake near the center of the new shop buildings, consisting of a concrete-pile structure 50 feet wide and 400 feet long with an approach wharf of the same width and 150 feet in length. The construction of this dock, the cost of which was approximately \$230,000, was completed at the close of the fiscal year with the exception of electrical installations.

#### DOCK 15, BALBOA

Dock 15, Balboa, originally constructed in 1911 and 1912 as a Panama Railroad lumber dock, had failed to such an extent that during the past year it was considered no longer safe for even automobile traffic. The old dock was 650 feet long and 55 feet wide, of concrete beam and slab construction supported on cylindrical concrete piers 8 feet in diameter. Subsequently, due to considerable outward movement, 50-ton anchors were installed at the rear of the dock. Due to continued movement, however, the 50-ton anchors were removed in

1928 and replaced by 80-ton anchors. The movement of the dock continued, however, until in 1932 failure was imminent and reconstruction necessary.

The design of the new dock consisted of massive rectangular piers with centers spaced 90 feet apart, carrying steel girders encased in concrete, which in turn carried a reinforced concrete slab. Rock bottom was found 60 to 65 feet below mean sea level, which together with a tidal range of 21 feet, made necessary a pier approximately 74 feet high. The construction of the pier was undertaken by Government forces and the estimated cost based on previous studies was approximately \$1,000,000.

Due to the character of the soil formation, the great depth of water and numerous subterranean obstacles such as boulders, old rails, and other junk, considerable difficulty developed in the construction of the cofferdam for the first pier. However, by June 1936 all preliminary work was completed and a total of 576 cubic yards of concrete in one pier was poured.

#### GATUN PROJECT

The development of the new Gatun townsite was continued throughout the year. The work performed included a large amount of excavation and grading, installation of sanitary sewers and water service lines, the construction of concrete roads and streets, sidewalks and garage approaches, and grass planting.

#### MADDEN DAM

The work accomplished by the municipal division during the year in connection with the completion of the Madden Dam consisted of the following: Ridge tightening, involving the injection of clay grouting, experimental drilling, running of final tests; maintenance of roads for the section of surveys; sluiceways examination, alteration, and repairs; cementing of power-house floors; assisting electrical division with construction work in connection with water cooling of Madden Dam concrete; preparation for cement grouting of contraction joints, including installation of cement-screening plant; seepage and subsurface investigations; and miscellaneous drilling.

#### CITIES OF PANAMA AND COLON

In addition to the usual maintenance work performed on the water and sewer systems and streets during the year, the following special projects were carried out: Renewal and enlargement of water line, Avenue A, Panama; improvement of water system near Centro Amador Guerrero School, between Fourteenth and Nineteenth

Streets, Panama; repairing curbing and installing retaining wall, M Street, Panama.

In addition to the above approximately \$26,000 was spent on the reconstruction of streets in Colon City.

#### WATER-PURIFICATION PLANTS AND TESTING LABORATORY

During the fiscal year 1936 the interior walls of all mixing chambers and settling basins of the Miraflores filtration plant were plastered with two coats of Portland cement stucco. The testing laboratory carried on a variety of work, making a total of 10,052 tests in connection with 4,759 varied samples, including alum, asphalt, cement, concrete, electrolyte for storage batteries, gas, gasoline, kerosene, metals and minerals, oils (fuel, Diesel, and lubricating), paint, sand, soils, tar, water, etc. The number of tests made of the principal items analyzed by the laboratory are as follows: Water, 4,696; concrete (test cylinders), 1,038; oils (fuel and Diesel), 738; gas, 337; gasoline, 282; lubricating oils, 96; sand, gravel, and crushed rock, 95.

#### PUBLIC ORDER

The number of persons placed under arrest during the year was 3,550, of whom 175 were females and 3,375 males, as compared with 159 females and 2,716 males, a total of 2,875, for the previous year. Of the arrests made during the past year, 3,239 were made without warrants and 311 with warrants. Of those arrested, 1,079, or 30.4 percent, were residents of the Canal Zone; 2,121, or 59.7 percent, were residents of the Republic of Panama; and 350, or 9.9 percent, were transients, consisting mostly of members of ships' crews. A total of 3,883 charges were filed against persons arrested, of which 91, or slightly more than 2 percent, were felonies.

The more common causes of arrest were: Violation of vehicle and traffic regulations, 1,970; loitering, 296; violation of immigration regulations, 277; disturbing the peace, 198; disorderly conduct, 191; vagrancy, 150; and battery, 140. The persons arrested included nationals from 74 countries and territories, and were of 181 different trades and professions.

Homicides totaled four during the year. Two were due to gunshot wounds, one defendant pleading guilty to second-degree murder and receiving sentence to the Canal Zone penitentiary, the other being charged with first-degree murder and subsequently committed to the Corozal hospital for the insane due to evidence of mental derangement. One homicide was due to felonious assault, voluntary manslaughter plea being entered, and each of the two defendants were sentenced to the Canal Zone penitentiary. One homicide was due to an automobile accident, as a result of which the operator of the

car was found guilty of involuntary manslaughter and given a suspended sentence.

Suicides during the year numbered four, of which two were by shooting, one by drowning, and one by hanging. The coroner investigated 58 deaths during the year, of which 17 were due to accidental drowning and 15 to natural causes.

The number of prisoners serving sentences in the common jails at the end of each month averaged 55. All prisoners who were physically able were employed on municipal work, public improvements, janitor and miscellaneous work at the police and fire stations, and at target ranges. The total value of such common-jail labor for the year was \$20,148.45.

Thirty-eight convicts were committed to the Canal Zone penitentiary during the year, with aggregate sentences of 139 years and 9 months; a total of 47 were discharged; none were pardoned during the year. At the close of the year 53 remained in confinement, as compared with 62 at the end of the preceding fiscal year. Labor performed by convicts during the year was valued at \$21,841.26 on the basis of standard rates of pay. The convicts were employed on road and municipal improvement work, improvement and maintenance of prison grounds and buildings, manufacturing and repairing of prison clothing, and the cultivation of fruits and vegetables, etc., at the penitentiary farm and at the experimental farm at Summit. The total value of fruits, vegetables, and other products of the penitentiary farm amounted to \$7,714.63, as compared to \$5,758.25 for the previous year.

Forty-seven persons were deported from the Canal Zone by the police during the year. Of this number 29 were convicts who had completed terms of imprisonment and 18 were persons who had been convicted of misdemeanor charges or who were deemed undesirable persons to be permitted to remain in the Canal Zone.

Continuous patrol of the harbors of Balboa and Cristobal was maintained throughout the year, principally for enforcement of navigation laws and regulations, and for the prevention of smuggling and irregular traffic. A police launch was maintained at Gamboa for the patrol of the Chagres River and the Canal in the vicinity of Gamboa. Another launch was maintained at Gatun for patrol of Gatun Lake, inspection of the 100-foot contour area to determine if unauthorized clearings or cultivation were being made, and for general policing. A motor launch was placed in service at Madden Dam during the year for the patrol of the Madden Dam lake area. Motor-cycle patrols for enforcement of vehicle-traffic regulations and for special emergency police service were continued throughout the year over all streets and roads of the Canal Zone.

Traffic accidents reported in the Canal Zone during the year totaled 452, or an average of 38 per month, resulting in the deaths of 3 persons and injuries to 191 persons, of whom 39 were pedestrians. Practically all of these accidents were due to careless and reckless operators and hence were avoidable. In 28 cases accidents were caused by intoxicated operators. The total number of traffic accidents shows a decrease of 31, or 6.4 percent, as compared with the previous fiscal year.

Detectives effected 148 arrests, and in addition made 1,230 investigations during the year. The usual routine work was carried on by the criminal identification bureau in cooperation with the Army and Navy and with other law-enforcement organizations and immigration authorities.

During the year the restaurant building at Balboa was completely remodeled and occupied by the central police station of the Balboa district.

### **FIRE PROTECTION**

During the year 107 fires, 5 false alarms, and 2 emergency alarms were reported. Of these, 66 occurred in property of the Panama Canal, 18 in Panama Railroad property, 4 in United States Army property, 1 in United States Navy property, and 18 in private property. The total estimated loss from all fires during the year amounted to \$17,699.52, of which \$3,248 was in Panama Canal property, \$105.50 in Panama Railroad property, \$1,502 in United States Army property, and \$12,844.02 in private property. A total of \$11,500 of the damage to private property was in commercial ships in Canal waters. The total value of property involved was \$12,-661,255.25.

Periodical inspections of all Government buildings, docks, storehouses, etc., were made, and fire extinguishers and other equipment maintained in good condition throughout the year. Twenty-four fire extinguishers and 3,000 feet of fire hose were added to the equipment as replacements.

### **MAGISTRATES' COURTS**

#### **BALBOA**

In the magistrate's court for the town and subdivision of Balboa, 11 cases were pending at the beginning of the fiscal year, 2,569 were docketed, and 2,572 were disposed of, leaving 8 cases pending. Of the cases disposed of, 26 were civil and 2,546 were criminal. In the latter, 2,169 resulted in conviction, 195 in acquittal, 125 were dismissed, and 57 were held to the district court. Fines, costs, and for-



feitures totaled \$10,427.10, as compared with \$5,242.80 for the previous fiscal year. A total of 1,485 traffic cases were tried during the year, as compared with 843 for the previous year. This increase is largely due to a more strict enforcement of the regulations, in addition to the natural increase in vehicular traffic.

Imposition or execution of sentence was suspended in 163 cases and the defendants were placed on probation. Of this group, four were rearrested for violating the terms of probation and were returned to serve the sentences originally imposed.

#### CRISTOBAL

In the magistrate's court for the town and subdivision of Cristobal, 1 case was pending at the beginning of the fiscal year, 953 cases were docketed, and 945 cases were disposed of during the year, leaving 9 cases pending. Of the cases disposed of, 10 were civil and 935 were criminal. In the latter, 816 resulted in conviction, 55 in acquittal, 21 were dismissed, 43 were held to the district court.

Imposition or execution of sentence was suspended in 45 cases and the defendants were placed on probation. Of this group, two were rearrested for violating the terms of probation and were returned to serve the sentences originally imposed.

#### PARDONS AND REPRIEVES

The pardon board, consisting of five members, acts under appointment of the Governor and in a purely advisory capacity. The retirement from the Panama Canal service of Mr. Elwyn Greene, chairman of the board, left a vacancy which had not been filled at the end of the fiscal year. No other changes in the personnel of the board were made during the year.

During the year 23 applications for Executive clemency were considered by the board. The exercise of Executive clemency was recommended in 9 of these cases; in 11 cases the denial of the application was recommended, and 3 cases were pending at the end of the year.

#### PUBLIC-SCHOOL SYSTEM

Except for the fact that in the Canal Zone the schools are situated in the various towns rather than in sections of a city, the school organization is comparable with the usual city school system in the United States, having a superintendent with assistants in general charge and a principal at each school.

For a number of years it has been the practice to make comparisons of enrollment from one year to the next on the basis of the number belonging at the end of February, as February is usually the peak

month. The total number of pupils enrolled in February of this fiscal year, in both white and colored schools, shows a decrease of 344 or about 5 percent since February 1935. In the white schools the enrollment dropped from 3,061 to 2,948, a decrease of 113 or almost 4 percent. This is largely accounted for by a decrease in enrollment of the white elementary schools, grades 1 to 6, on the Atlantic side, as the enrollment in the two high schools shows a slight increase. In the colored schools the enrollment dropped from 3,600 to 3,369, a decrease of 231 students, or more than 6 percent. Free school privileges are granted to silver employees of the Panama Canal and the Panama Railroad only when such employees reside on the Canal Zone. Colored school enrollment has shown a steady decline since 1932, the peak year, when the number enrolled in February was 4,149.

The junior college made a substantial growth in enrollment during the past year. In February 1936, 96 students were enrolled, representing a gain over February 1935 of 18 pupils, or approximately 23 percent. The junior college has shown a gradual increase in enrollment during the 3 years it has been established, and it is expected that the coming year will likewise show a slight increase. A large number of the junior-college graduates of 1936 expect to pursue further their college training by enrolling in universities in the United States.

Academic achievement for the school year continued to compare favorably with standards set in the better schools of the United States. As measured by standard tests, the average Canal Zone white school student shows an achievement substantially above that of the average school student in the United States. In the colored schools, standard tests show student achievement to be somewhat below that in similar grades of the white schools, in all subjects except spelling and penmanship. For these courses the colored pupils excel the white students.

As the Canal administration desires to offer maximum opportunity for specialized types of studies, it has been the policy of the schools division to adjust the school curriculum to the special needs of Canal Zone children. With this end in view, revision of the curriculum was begun during 1931 when a specialist from Columbia University was brought to the Isthmus to organize the program. Courses are now designed to fit the changing needs of the Canal Zone pupils, and in the future, constant attention will be given to curriculum revision.

Vocational work was introduced in the colored schools in 1930 and the progress to date has been satisfactory. School gardening especially has proven an outstanding success and is now required of all boys in grades 7 and 8. In addition to the valuable knowledge

gained by the students, the garden produce provides a considerable revenue towards the expense of such instruction. Agriculture, it is believed, offers one of the more satisfactory outlets for the large number of West Indian unemployed youth in the Canal Zone and in the Republic of Panama after they have finished their education. During the year, instruction in tailoring was added to the colored vocational program, with very satisfactory results. Shop work for boys in the colored junior high schools is being successfully taught. Students are instructed in the use of hand tools, and make furniture and do general cabinet work. Colored girls in the junior high schools are given instruction in sewing, cooking, laundering, and housekeeping.

The maintenance of the Panama Canal astronomical observatory, founded in July 1930, was taken over by the division of schools during the year. The observatory is operated for the instruction and use of the general public, and during the year was visited by teachers and students of public and private schools of both the Canal Zone and Panama and by United States military personnel on the Isthmus, as well as other interested individuals.

#### POSTAL SYSTEM

Fourteen post offices were in operation at the close of the fiscal year. At the Gamboa post office a postmaster was appointed to relieve the commissary manager of the duties in connection with the postal service at that point.

Gross receipts of the postal service were \$393,860.32, as compared with \$350,737.92 for the previous year, an increase of \$43,122.40, or approximately 12 percent. The expenditures aggregated \$333,558.39, as compared with \$306,865.85 during the previous year, an increase of \$26,692.54, or about 9 percent. This increase in expenditures is due largely to an increase over the previous year of \$18,491.11 in the payment to the United States Post Office Department for the transportation of Canal Zone air mail. After deducting all operating expenses, there remained a surplus of \$60,301.93,<sup>1</sup> or 15.3 percent of the gross receipts.

The sale of postage stamps, postal cards, stamp books, etc., amounted to \$265,481.25 of the total receipts above mentioned.

There has been no change in the system providing for the issue of nonnegotiable deposit money orders in lieu of postal saving certificates, although the interest rate on deposit money orders was reduced

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<sup>1</sup> Statistics covering the postal system include interest paid on savings deposits as well as interest earned on the postal funds invested. Audited figures shown in section V of this report do not include interest items, as these transactions are cleared through special funds.

to 2 percent per annum, effective January 1, 1936. The system continues to operate satisfactorily, with a minimum of labor and expense, and reached a total of \$1,882,940 at the close of the fiscal year. During the year 27,973 deposit money orders were issued, amounting to \$1,726,305, compared with 29,392 issued during the previous year, aggregating \$1,838,655. A total of 27,345 deposit money orders was paid in the amount of \$1,682,170, compared with 28,125 during the previous fiscal year, amounting to \$1,710,370. The balance to the credit of depositors in the deposit money-order system increased from \$1,810,300 at the close of last fiscal year to \$1,882,940 at the end of the fiscal year just closed. Since 1922 there has been paid to depositors as interest on deposit money orders the sum of \$281,613.87, while there has been received as postal revenues interest on such deposits amounting to \$549,746.16, resulting in a surplus of \$227,702.52 after deducting accrued interest on June 30, 1936, totaling \$40,429.77, as reported by postmasters.

There were 164,470 fee-paid money orders issued during the year, amounting to \$2,904,898.23, on which fees amounted to \$17,153.42. Compared with the previous year this was an increase of 12,434 in the number of orders issued and \$1,299.99 in the amount of fees collected. Regular money orders paid during the year numbered 34,594, amounting to \$515,105.61, compared with 33,995 orders paid during the previous year, amounting to \$478,924.97.

Post offices handled 203,080 registered and insured articles, and foreign parcel post, as compared with 204,466 for the previous year. Dispatches totaled 98,324 articles subdivided as follows: 21,902 domestic letters, 48 domestic registered parcels, 28,641 foreign letters, 4,494 foreign registered parcels, 36,379 official letters and parcels registered free, 6,860 insured and c. o. d. parcels.

During the year, 2,340 dispatches of mail were made by the Cristobal post office, subdivided as follows: (a) By steamers to the United States, 308 dispatches; (b) by steamers to foreign countries, 2,032 dispatches. Dispatches numbering 872 were received from the United States by steamer and 2,497 dispatches from foreign countries. The Balboa post office, which dispatches mail to the west coast exchange offices of the United States and Central and South America, made 2,867 and received 1,477 dispatches during the year.

No new stamps were issued during the year, although preliminary steps were taken for the addition of another stamp to our permanent series to commemorate the work of the late Gen. William L. Sibert.

#### AIR MAIL

During November 1935 the air-mail schedules were revised in an endeavor to minimize delays and to speed up the service. This revision was found to be unsatisfactory, however, and a new schedule

was inaugurated effective with departures from the United States and South American terminal points July 15, 1936. The present schedules continue to be well maintained despite the hazards of long flights. No changes were made in the air-mail postage rates to foreign countries during the year.

The Cristobal post office continued to handle all air-mail matter exchanged between the United States and the west coast of South America. However, under the new schedules, effective July 15, 1936, the principal base of operations was transferred to Barranquilla, Colombia, to be operated by a United States postal agency established at that point. Under this schedule the transfer operations in the future will be restricted at Cristobal to the handling of United States mail from Brownsville and the preparation of such reports and statements as may be necessary. A total of 5,369 air-mail dispatches was forwarded by Cristobal during the year, and 7,499 were received, compared with 5,190 forwarded and 8,430 received during the previous year. Dispatches were regularly made to an average of 58 exchange offices and received from an average of 60 offices. The number of dispatches will not be materially reduced under the new air-mail schedules since the volume of Canal Zone mail now calls for dispatches to practically all exchange offices in Central and South America.

Sales of air-mail postage amounted to \$113,427.55 during the year, representing an increase of approximately 29 percent over the previous year. Transportation charges on Canal Zone air-mail matter dispatched during the year aggregated \$94,585.81, or \$18,841.74 less than receipts for the same period.

#### POST-OFFICE BUILDINGS

Plans are being drawn for a new post-office building to be constructed at Balboa during 1937, for which funds have been allotted. The most pressing need for a new post-office structure remaining is that at Ancon, where the building is entirely inadequate for the volume of mail handled and the cost of maintenance of the old structure is out of proportion to its value. The remodeling of the railroad station at Corozal, at present unoccupied, is still under consideration to provide a permanent site for the Corozal post office.

#### CUSTOMS

The various activities of the bureau of customs were continued along the lines outlined in previous annual reports. The following is a statistical summary of the principal items, with the figures for the preceding year shown for comparison:

Item	Fiscal year	
	1935	1936
Vessels entered.....	11, 924	12, 248
Vessels cleared.....	11, 939	12, 241
Total.....	23, 863	24, 489
Vessels of United States registry entered.....	4, 771	4, 544
Vessels of United States registry cleared.....	4, 779	4, 543
Customs releases on shipments consigned to Panama.....	11, 831	13, 650
Free-entry releases for shipments to employees of United States Government.....	5, 706	5, 831
Arrests for violation of Narcotic Drug Import and Export Act.....		2
Arrests for violation of customs regulations.....		4
Shipments of household goods of employees of United States, inspected and sealed for shipment to United States.....	84	70
Pieces of freight included in above.....	558	479
Invoices certified for shipment to United States.....	624	653
Special customs inspection out of regular hours:		
Cristobal.....	721	701
Balboa.....	521	456
Total.....	1, 242	1, 157
Fees collected for above.....	\$8, 746	\$9, 210
Cargo deposited to be held for orders (Canal Zone for orders):		
Cristobal:		
Consignments received.....	175	91
Releases for delivery or forwarding.....	655	533
Balboa:		
Consignments received.....	30	20
Releases for delivery or forwarding.....	174	146
Chinese passengers arriving.....	1, 247	1, 148
Chinese admitted to Panama.....	257	238
Vessels with Chinese crews checked.....	561	645

### SHIPPING COMMISSIONER

The shipping commissioner and his deputies have the same powers as shipping commissioners in United States ports and United States consuls in foreign ports with respect to United States seamen. During the year, 3,674 seamen were shipped on vessels of the United States and 3,544 discharged. No sick or destitute seamen were returned to the United States at the expense of the appropriation for the relief of destitute American seamen, but 219 were signed on vessels as seamen or workaways and returned to the United States without expense to the Government.

Wages earned by seamen discharged at Canal Zone ports aggregated \$150,582.66; the total approved for deductions on account of advances, allotments, fines, slop-chest amount, etc., was \$47,680.84, and \$102,901.82 was either paid to seamen under the supervision of the deputy shipping commissioners or received on deposit for the seamen by the deputy shipping commissioners. The wages, money, and effects of three American seamen who died in Canal Zone hospitals were remitted to the proper courts in the United States for disposition.

### ADMINISTRATION OF ESTATES

The public administrator takes charge of all estates within the Canal Zone which require administration and are not administered

by others legally entitled to administer them. In the case of estates with total assets exceeding \$1,000 in value the public administrator charges regular commissions fixed by law which are paid into the Treasury of the United States. Commissions amounting to \$1,754.87 were collected during the fiscal year. The estates of 132 deceased or insane persons were settled, as compared with 94 in the previous year. The amount involved in the settlement of the 132 estates was \$46,111.98. On June 30, 1936, there were 33 estates in course of administration.

### LICENSES AND TAXES

Licenses issued for motor vehicles, permits for peddling foodstuffs, the sale of merchandise generally, ships' runners, and similar purposes numbered 11,526 for the year.

The number of motor-vehicle licenses and transfers, and miscellaneous licenses issued during the past 10 years, and the aggregate fees collected therefor are summarized below. These include licenses for official vehicles.

Year	Motor vehicle	Motor vehicle transfers	Miscellaneous licenses	Total	Fees
1927.....	5, 107	1, 391	2, 401	8, 899	\$34, 731. 79
1928.....	5, 543	1, 490	1, 876	8, 909	36, 875. 89
1929.....	6, 345	1, 729	1, 093	9, 167	40, 894. 30
1930.....	7, 280	1, 862	1, 064	10, 206	45, 603. 84
1931.....	8, 128	2, 083	1, 443	11, 654	51, 295. 46
1932.....	8, 577	1, 906	1, 312	11, 795	52, 143. 07
1933.....	8, 432	2, 270	1, 155	11, 857	50, 038. 54
1934.....	8, 389	2, 311	1, 392	12, 092	52, 795. 70
1935.....	10, 397	2, 685	1, 122	14, 204	56, 109. 65
1936.....	10, 268	3, 276	1, 258	14, 802	61, 481. 79

### FOREIGN CORPORATIONS

Foreign corporations doing business in the Canal Zone are required to secure licenses, and for the fiscal year 82 such corporations, the majority of which are steamship lines and steamship agencies, were licensed. Fees amounting to \$820 were collected. Taxes paid by corporations amounted to \$123.11.

### INSURANCE

The license fee for insurance companies doing business in the Canal Zone is \$10 per year. At the end of the fiscal year 12 companies had been given licenses. These companies reported that as of December 31, 1934, 815 policies were in force. During the calendar year 1935, 260 policies were issued and 109 canceled, leaving 966 in force as of December 31, 1935, having an aggregate face value of \$3,015,761.88. Annual premiums collected during the calendar year 1935 totaled \$124,753.71.

During the calendar year 1935 the premiums received by miscellaneous insurance companies, including accident, automobile liability, fire, surety, fidelity, etc., but excluding life insurance, amounted to \$93,137.12. Losses paid during the year totaled \$22,424.48.

The taxes paid on premiums by all classes of insurance companies amounted to \$3,268.36 for the calendar year 1935, as compared with \$3,078.54 during the previous year.

#### IMMIGRATION VISAS

During the year 23 visas were issued by the executive secretary to alien residents of the Canal Zone going to the United States. Of these, 4 were quota visas, 12 were nonquota visas, and 7 were non-immigrant. Fees collected for visas amounted to \$201.50.

#### RELATIONS WITH PANAMA

During the year direct correspondence was conducted between the Panama Canal Administration and the Republic of Panama with reference to various matters of joint interest. The greater part of this correspondence was of a routine nature dealing with problems relating to agriculture, aviation, customs duties, immigration, municipal improvements, public health, vital statistics, and court records, vehicle licenses and registration, extradition, postal service, schools, entrance and clearance of vessels, annual and complimentary passes over the Panama Railroad, Thatcher Ferry operation, Panama Railroad operations, while matters of less routine nature included registration or repatriation of aliens, and land rentals.

#### COMMERCIAL AVIATION

The following is a résumé of the passenger, air mail, and air express traffic during the fiscal year 1936 of the various commercial airways operating between the Canal Zone and foreign countries, as well as that of the company operating in intra-Canal Zone air commerce. Comparisons in each case are made with the amount of such traffic during 1935.

	Pan American Airways, Pan American-Grace Airways, and U. M. C. A.		Isthmian Airways	
	1935	1936	1935	1936
<b>NUMBER OF PASSENGERS</b>				
Canal Zone and foreign:				
Incoming.....	1,922	1,239		
Outgoing.....	1,788	998		
Total.....	3,710	2,237		
Intra-Canal Zone: Passengers carried.....			9,481	9,239
<b>AIR EXPRESS AND MAIL</b>				
Air express and mail carried (pounds).....	69,342	53,601.7		



The commercial airways operating between the Canal Zone and foreign countries used throughout the year the facilities at Albrook and France Fields, of the Army, and the fleet air base, Coco Solo, of the Navy.

### REVISION OF CANAL ZONE EXECUTIVE ORDERS

In the work of revision of the Executive orders relating to the Panama Canal and the Canal Zone, undertaken as a sequel to the codification of the laws of the Canal Zone, considerable progress was made during the year; however, the work was not completed due to interruption by various problems which were considered to be more pressing. The work will be carried to completion in the office of the general counsel.

## SECTION V

### FINANCIAL AND STATISTICAL STATEMENTS

Financial statements of major interest relative to the Panama Canal are presented in this section. These statements are abstracted from the annual report of the accounting department.

### ACCOUNTING SYSTEM

The accounting system inaugurated in 1932 on the recommendation of the Bureau of Efficiency to conform as far as practicable to the principles and practices approved by the Interstate Commerce Commission and State boards regulating public utilities was continued in effect during the fiscal year 1936 with such minor changes as were necessary to conform to changing conditions.

The accounting system fixes July 1, 1921, as the close of the construction and development period of the Panama Canal, and all interest on United States Treasury funds advanced up to that date has been capitalized. Capital interest subsequent to that date, while not included on the balance sheet, is considered as a statistical charge to operating expenses for comparison with net revenues. Additions to the capital-investment account are made from time to time by the inclusion of the cost of new capital additions (such as Madden Dam); deductions are made of the amounts of withdrawals and retirements of capital assets, such as through the sale of property or the absorption of value of buildings or equipment through charges for depreciation.

Based on the foregoing principles, the capital investment at the beginning of the fiscal year 1936 stood at \$546,636,490.05. Interest at 3 percent on this amount is \$16,399,094.70 and should be considered as an expense of operating the Canal.

At the end of the fiscal year 1936, following the same principles, the capital investment was \$549,874,826.95, and the interest charge for the fiscal year 1937 will be computed on that amount.

The net revenues of the Canal during the fiscal year 1936 amounted to \$14,531,654.54 on Canal operations and \$920,185.23 on business operations, a total of \$15,451,839.77. Based on the capital investment at the beginning of the year, this revenue is less by 0.17 percent than the interest charge of 3 percent.

#### OPERATIONS OF THE PANAMA RAILROAD CO.

The results from the operations of the railroad proper and its various business units on the Isthmus are shown in detail in the accounts of the Panama Railroad Co. The detailed statement of revenue, expenses, and statistics of all railroad industries, changes in the capital account, and the results from the operations of the steamship line appear in the regular annual reports of the Panama Railroad Co. A review of these activities is presented in section II of this report under the heading Business Operations Under the Panama Railroad Co.

The result from all Panama Railroad operations on the Isthmus during the fiscal year 1936 was a net revenue of \$1,077,987.07, as compared with \$927,642.87 for 1935, an increase of \$150,344.20 for the year.

#### PANAMA CANAL OPERATIONS

The major financial result of Panama Canal operations is presented hereinafter in tables nos. 1 to 27, with supplementary comments and explanations.

The following is a list of all of the tables and bureau reports contained in the annual report of the accounting department. The tables and reports nos. 28 to 57, inclusive, are not published because they are concerned principally with details of operations which lack general interest, and their publication would be an unwarranted expense. The complete report for the accounting department, as well as those of the other departments and divisions, may be consulted at the office of the Governor or at the Washington office of the Panama Canal. For purposes of reference, the complete list of tables and reports for the accounting department is published below. Following the list are presented the major tables nos. 1 to 27, inclusive, with various notes of explanation.

## GENERAL BALANCE SHEET

Table no.

## ASSETS

1. General balance sheet.
2. Canal fixed property and equipment.
3. Canal equipment.
4. Business fixed property and equipment.
5. Public works, Republic of Panama.
6. Revenues due United States Treasury.
7. Security deposit funds.
8. Independent trust funds.
9. Cash receipts and disbursements.
10. Accounts receivable registered and outstanding.
11. Stores (material and supplies).
12. Work in progress.
13. Deferred charges.

## LIABILITIES

14. Capital investment.
15. Accounts payable.
16. Reserves for replacements.
17. Reserve for repairs.
18. Reserve for vacation pay.
19. Deferred credits.
20. Income, expenses, and net revenues (current).
21. Revenues, expenses, and computed surplus.
22. Capital refundments (miscellaneous receipts and Canal appropriations).
23. Balance of revenues and refundments.

## DETAILS OF OPERATIONS FOR PROFIT AND LOSS

(Summaries on tables 20 and 21)

24. Canal revenues.
25. Canal earnings, expenses, and net revenues.
26. Business revenues, expenses, and net revenues.

## MISCELLANEOUS

27. Balances in appropriation and fund accounts.

## ADDENDA NOT PUBLISHED

(On file at Balboa Heights or the Washington office of the Panama Canal—see prefatory notes)

28. Collection of United States funds by collector.
29. Cost of dredging.
30. Cost of electric current.
31. Cost of production of water.
32. Postal service revenues.
33. Money-order statistics fiscal year 1936.
34. Money-order statistics 1907 to 1936.
35. Postal service statistics.
36. Clubs and playgrounds, balance sheet.
37. Clubs and playgrounds, income and expenditures.
38. Audited pay rolls.
39. Pay-roll deductions.
40. Rents and miscellaneous collections, silver employees.
41. Silver quarters statistics.

Table No.

42. Rent collections from nonemployees.
43. Commissary coupons issued.
44. Accounts payable registered, Panama Canal.
45. Accounts payable registered, Panama Railroad.
46. Personal injury claims.
47. Injuries and deaths, Panama Canal and Panama Railroad.
48. Injuries and deaths, payments under various acts.
49. Damages to vessels.
50. Freight and cargo claims.
51. Report of the accounting bureau.
52. Report of the auditing bureau.
53. Report of the traveling inspection bureau.
54. Report of the time inspection bureau.
55. Report of the property inspection bureau.
56. Report of the general bureau.
57. Report of the pay-roll section.

TABLE No. 1.—General balance sheet, June 30, 1936

ASSETS	
Capital assets:	
Canal fixed property and equipment (tables nos. 2 and 3)-----	\$514, 123, 485. 34
Business fixed property and equipment (table no. 4)-----	30, 427, 202. 61
Total capital assets-----	\$544, 550, 687. 95
Reimbursable capital expenditures:	
Public works, Republic of Panama (table no. 5)-----	1, 204, 139. 00
Revenue due U. S. Treasury-----	231, 387. 56
Special funds:	
Security deposit funds (table no. 7)-----	\$465, 034. 55
Independent trust funds (table no. 8)-----	2, 546, 899. 30
Total special funds-----	3, 011, 933. 85
Working assets:	
Appropriated cash in U. S. Treasury (table no. 9)-----	\$4, 347, 410. 85
Appropriated cash with fiscal officers (table no. 9)-----	2, 296, 832. 32
Accounts receivable (table no. 10)-----	612, 055. 00
Stores (table no. 11)-----	4, 200, 154. 16
Work in progress-----	91, 099. 37
Total working assets-----	11, 547, 551. 70
Deferred charges-----	321, 151. 35
Total assets-----	560, 866, 851. 41
LIABILITIES	
Capital investment:	
Net appropriations by Congress-----	\$406, 222, 466. 52
Interest on appropriations-----	143, 652, 360. 43
Total capital investment (table no. 14)-----	\$549, 874, 826. 95
Special fund obligations (see assets)-----	3, 011, 933. 85
Working liabilities:	
Accounts payable (table no. 15)-----	1, 336, 434. 96
Funded reserves:	
Reserve for replacements (table no. 16)-----	\$2, 035, 209. 05
Reserve for repairs (table no. 17)-----	871, 302. 46
Reserve for vacation pay (table no. 18)-----	471, 448. 99
Total funded reserves-----	3, 377, 960. 50
Deferred credits-----	524, 126. 06
Revenues and refundments:	
Net revenues to June 30, 1935-----	206, 517, 411. 40
Net revenues fiscal year 1936 (table no. 20)-----	15, 451, 839. 77
Total net revenues (table no. 21)-----	221, 969, 251. 17
Canal depreciation (unfunded)-----	18, 981, 743. 87
Plant depreciation (unfunded)-----	2, 100, 000. 00
Total-----	243, 050, 995. 04
Less capital refundments (table no. 22)-----	240, 309, 425. 93
Balance of revenues and refundments (table no. 23)-----	2, 741, 569. 09
Total liabilities-----	560, 866, 851. 41

The terms and arrangement of the foregoing balance sheet follow closely the generally accepted principles of corporate accounting, except as to the last item, "Revenues and refundments." The statutes require that receipts for tolls, civil revenues, and net profits on business operations shall be covered into the United States Treasury, and relinquished from control of the Panama Canal.

Funds for current operating expenses and capital construction are appropriated by the Congress, and for accounting purposes are considered as provided from the tolls and other receipts covered into the Treasury. Practically all receipts other than those cited above are repayable to Canal appropriations, and may be reexpended, but as the Canal is deprived of tolls revenues, its principal source of income, the reexpendable receipts are insufficient to provide for operation and maintenance, thus requiring the Canal to submit its expenditure program annually to the Congress.

Total net revenues, appearing under the caption, "Revenues and refundments", represent the accumulated operating earnings of the Panama Canal before capital interest charges. This net revenue, however, has been covered into the United States Treasury in the form of tolls and other receipts. It therefore follows that net capital refundments and net revenues earned will always be approximately the same, except for the fluctuation of unexpended appropriated cash and other current items.

The items "Canal depreciation (unfunded)" and "Plant depreciation (unfunded)" have been charged against "Net revenues", but are restored thereto on the balance sheet exhibit because the corresponding cash revenue to cover these charges has been either covered into the United States Treasury in the form of tolls, or deducted from appropriations by the Congress for current operating expenses of the Canal.

The "Funded reserves", under a separate balance sheet caption, are also charged against current operations, but differ from the "Unfunded" reserves in that these charges are included in operation appropriations, and are therefore represented in the appropriated fund balances under "Working assets."

These various fund requirements leave the Panama Canal balance sheet without an equivalent for the usual corporate "Surplus account", since any surplus is included in the tolls covered into the Treasury, by law. However, the equivalent for "Surplus account" is shown on table no. 21, which compares "Total net revenues" of \$221,969,251.17, appearing on the balance sheet, with the computed interest on the capital investment, by years, from July 1, 1922, but no interest charge against the Canal is actually made by the United States Treasury.

TABLE No. 2.—Canal fixed property, fiscal year 1936

	Balance July 1, 1935	Additions	With drawals	Balance June 30, 1936
<b>Channels, harbors, and basins:</b>				
Balboa to Pedro Miguel	\$24,309,928.86			\$24,309,928.86
Pedro Miguel to Gatun	113,466,691.77			113,466,691.77
Gatun to Cristobal	12,829,445.51			12,829,445.51
<b>Breakwaters:</b>				
Naos Island	1,075,874.10			1,075,874.10
Colon—East	3,994,727.10			3,994,727.10
Colon—West	4,528,829.57			4,528,829.57
<b>Locks:</b>				
Miraflores	24,586,787.54			24,602,502.21
Storage shed		\$15,714.67		
Pedro Miguel	16,770,362.46			16,770,362.46
Gatun	37,914,498.12			37,914,498.12
<b>Dams:</b>				
Miraflores	1,228,561.63			1,228,561.63
Pedro Miguel	457,302.32			457,302.32
Madden	9,391,308.28	260,220.88		9,651,529.16
Gatun	10,475,943.56			10,475,943.56
Gatun—Mindí levee	148,974.22			148,974.22
<b>Spillways:</b>				
Miraflores	1,398,684.94			1,398,684.94
Gatun	4,323,538.02			4,323,538.02
<b>Aids to navigation:</b>				
Lighthouses and beacons	548,769.52			548,769.52
Buoys and other markers	295,473.80			295,473.80
Buildings and landings	127,318.29			127,318.29
<b>Wharves and piers:</b>				
Balboa (Nos. 14 to 19)	3,317,826.59			3,513,876.62
No. 15, reconstruction (part)		196,050.03		
Cristobal (Nos. 6, 14, 15)	2,753,278.57			2,753,278.57
Gamboa (part)	10,142.49	219,731.20		229,873.69
<b>Drydocks:</b>				
Balboa	3,576,872.10			3,623,712.29
Drydock blocking (part)		46,840.19		
Cristobal	647,409.73			665,852.92
Drydock crane (completed)		20,874.00		
Drydock blocking (adjustment)			\$2,430.81	
<b>Coaling plants:</b>				
Balboa	2,284,568.35			2,284,568.35
Cristobal	3,679,797.59			3,679,797.59
<b>Dredging plant, Gamboa</b>				182,208.06
Main shop building (part)		84,564.54		
Sand blast shed (part)		14,222.69		
Paint shop (part)		8,954.16		
Motorboat repair shop (part)		9,109.20		
General storehouse (part)		41,198.85		
Spare-parts shed (part)		15,146.18		
Lumber shed (part)		9,012.44		
<b>General capital expenditures:</b>				
Purchase price new Panama Canal Co.	131,717,335.97			31,717,335.97
Treaty payment to Republic of Panama, 1904	10,000,000.00			10,000,000.00
Annual treaty payments to Republic of Panama, 1913-21	2,250,000.00			2,250,000.00
Relocation, Panama Railroad	9,800,626.46			9,800,626.46
Reequipment of Panama Railroad	3,247,332.11			3,247,332.11
Depopulation, Canal Zone	2,701,016.24			2,701,016.24
<b>Buildings:</b>				
Office buildings	2,065,539.61			2,100,539.61
Telephone building, Cristobal, transfer		35,000.00		
Gorgas Hospital	1,801,871.49			1,801,871.49
Corozal Hospital	520,996.33			514,496.33
Building No. 550 (demolished)			6,500.00	
Colon Hospital	314,615.86			314,615.86
Dispensaries	211,324.38			211,324.38
Palo Seco leper colony	76,928.46			80,670.14
Ward Building (part)		3,741.68		
Quarantine stations	63,392.70			63,392.70
Other health department structures	97,801.94			97,801.94
Clubs and playgrounds	462,208.35			644,432.44
Transfer and adjustment		173,351.53		
Conversion, Cristobal restaurant (part)		8,872.56		
Post offices	20,252.62			20,252.62
Schoolhouses	1,657,854.27			1,656,579.27
High school and junior college (completed)		950.00		
Building No. 778, Balboa, transfer			2,225.00	
Fire stations	104,876.74			104,876.74

<sup>1</sup> Original purchase price of \$40,000,000, less Panama Railroad Co. capital stock and sales and transfers of property acquired.

TABLE No. 2.—*Canal fixed property, fiscal year 1936—Continued*

	Balance July 1, 1935	Additions	With- drawals	Balance June 30, 1936
<b>Buildings—Continued.</b>				
Police stations.....	\$32, 719. 47			\$152, 524. 47
Balboa police station, conversion.....	90, 675. 40	\$71, 627. 19	\$42, 302. 59	
Paraiso police station, (demolished).....			195. 00	
Prisons.....	30, 000. 00			30, 000. 00
Courthouses.....	130, 892. 39			130, 892. 39
Other buildings and structures.....	166, 809. 71			181, 371. 65
Building No. 778, Balboa, transfer.....		2, 225. 00		
Building No. 520, Colon, transfer.....		3, 600. 00		
Lock guard quarters, Miraflores (part).....		3, 854. 38		
Lock guard quarters, Pedro Miguel (part).....		4, 882. 56		
Permanent townsites.....	1, 554, 911. 13			1, 642, 568. 16
Gamboa.....		109, 170. 24		
Gatun.....		37, 188. 75		
Gatun, transfer.....			58, 701. 96	
Roads, streets and sidewalks.....	4, 530, 858. 56			4, 856, 348. 44
Widen Fourth of July Avenue.....		27, 602. 43		
Relocate Gaillard Highway.....		57, 741. 47		
Streets, Gamboa.....		90, 977. 76		
Streets, Gatun.....		67, 672. 73		
Reconstruction, Bolivar Highway.....		37, 536. 69		
Reconstruction, Randolph Road.....		27, 504. 32		
Miscellaneous additions.....		16, 454. 48		
Storm sewers.....	574, 978. 56			656, 711. 55
Amador sewer, extension.....		25, 210. 09		
Gamboa sewers.....		43, 514. 47		
Gatun sewers.....		9, 408. 31		
Miscellaneous extensions.....		3, 600. 12		
Street lighting system.....	149, 212. 64	15, 202. 08		164, 414. 72
Interest during construction period.....	143, 652, 360. 43			143, 652, 360. 43
<b>Total, Canal fixed property.....</b>	<b>502, 170, 306. 85</b>	<b>1, 818, 527. 87</b>	<b>112, 355. 36</b>	<b>503, 876, 479. 36</b>

TABLE No. 3.—*Canal equipment, fiscal year 1936*

	Balance, July 1, 1935	Additions	With- drawals	Balance, June 30, 1936
<b>Tugs.....</b>	<b>\$1, 753, 475. 04</b>			<b>\$1, 828, 276. 24</b>
Arraijan (completed).....		\$89, 900. 61		
Alhajuela (completed).....		89, 900. 59		
Bolivar, sold.....			\$105, 000. 00	
Supply boats.....	51, 544. 48			51, 544. 48
Launches.....	359, 277. 46			365, 243. 63
Hinds, new.....		12, 000. 00		
Shark, new.....		11, 300. 00		
Hinds, retired.....			6, 000. 00	
Porpoise, retired.....			11, 333. 83	
Dredges.....	2, 570, 236. 01			2, 570, 236. 01
Lighters and scows.....	1, 486, 989. 94			1, 616, 989. 94
No. 126, built.....		130, 000. 00		
Floating cranes.....	659, 524. 29			659, 524. 29
Craneboats.....	517, 833. 70			517, 833. 70
Barges.....	497, 406. 73			499, 869. 00
Grader barge No. 21 (completed).....		2, 462. 27		
Ferryboats.....	255, 860. 15			255, 860. 15
Floating caisson (locks).....	347, 868. 15			347, 868. 15
Towing locomotives (locks).....	1, 449, 756. 66	16, 969. 44		1, 466, 726. 10
Excavators.....	27, 370. 00			27, 370. 00
Cranes.....	16, 030. 00			16, 030. 00
Marine salvage equipment.....	23, 784. 29			23, 634. 29
Diving barge No. 93, retired.....			150. 00	
<b>Total Canal equipment.....</b>	<b>10, 016, 956. 90</b>	<b>352, 532. 91</b>	<b>122, 483. 83</b>	<b>10, 247, 005. 98</b>
<b>Canal fixed property (table no. 2).....</b>	<b>502, 170, 306. 85</b>	<b>1, 818, 527. 87</b>	<b>112, 355. 36</b>	<b>503, 876, 479. 36</b>
<b>Total, Canal fixed property and equipment.....</b>	<b>512, 187, 263. 75</b>	<b>2, 171, 060. 78</b>	<b>234, 839. 19</b>	<b>514, 123, 485. 34</b>

TABLE NO. 4.—*Business fixed property and equipment, fiscal year 1936*

	Balance July 1, 1935	Additions	With- drawals	Balance June 30, 1936
<b>BUSINESS FIXED PROPERTY</b>				
Hydroelectric plant, Gatun.....	\$1,755,561.45			\$1,755,561.45
Miraflores power plant.....	1,525,616.79			1,525,616.79
Substations.....	1,375,306.34			1,410,584.27
Improvements, Summit substation.....		\$5,040.93		
Improvements, Gamboa substation.....		41,198.91	\$11,418.00	
Improvements, Fort Sherman substation.....		456.09		
Transmission system.....	1,325,355.78			1,350,585.18
Improvements, Gamboa.....		17,607.83		
Additional ground wires.....		7,621.57		
Distribution system.....	1,376,137.90			1,486,500.32
Additions, Gamboa.....		60,663.30		
Additions, Gatun.....		23,036.45		
Additions, Fort Sherman.....		18,517.95		
Additions, France Field.....		8,144.72		
Madden Dam system.....	1,545,977.64	16,795.83		1,562,773.47
Total, electric light and power system.....	8,903,955.90	199,083.58	11,418.00	9,091,621.48
Electric work.....	202,842.24			202,842.24
Zone water system.....	867,001.42			891,727.36
Miraflores pump station, transfer.....		44,225.46		
Water-line extensions, Gamboa.....		66,049.32		
Concrete tank, Gamboa (part).....		8,667.98		
Water-line extensions, Gatun.....		16,420.71		
Agua Clara reservoir, abandoned.....			101,824.74	
Shop, Cristobal, transfer.....			8,812.79	
Zone-Panama water system.....	1,842,509.46			1,919,729.57
Engineer's Hill reservoir, Corozal.....		121,445.57		
Miraflores pump station, transfer.....			44,225.46	
Zone-Colon water system.....	819,487.36			819,487.36
Tanks, Mount Hope.....		137,153.56		
Brazos Brook reservoir (part), abandoned.....			137,153.56	
Total, water system.....	3,528,998.24	393,962.60	292,016.55	3,630,944.29
Municipal engineering works, transfer.....		8,812.79		8,812.79
Balboa shops.....	2,402,651.71			2,408,842.83
Drydock storage shed (part).....		1,669.75		
Oxyacetylene shop (part).....		6,727.03		
Rigging shop (part).....		9,470.70		
Yard fence (adjustment).....			11,676.36	
Cristobal shops.....	546,168.52			580,866.47
Boiler shop (part).....		22,254.27		
Machine shop (part).....		1,745.40		
Electric plant (part).....		424.46		
Yard tracks, etc. (part).....		18,162.68		
Yard fence (adjustment).....			5,015.99	
Street lighting, transfer.....			2,872.87	
Total, mechanical division.....	2,948,820.23	60,454.29	19,565.22	2,989,709.30
Balboa fuel-oil plant.....	767,009.58			711,497.22
Pump.....		14,370.85		
Tank 112, Balboa.....		12,100.00		
Tank 116, Balboa, transfer.....			2,364.36	
Pipe lines (adjustment).....			79,618.85	
Cristobal fuel-oil plant.....	1,074,949.55			1,108,411.49
Pump.....		12,353.50		
Pipe lines (adjustment).....		79,618.85	58,510.41	
Total, fuel-oil plants.....	1,841,959.13	118,443.20	140,493.62	1,819,908.71
General storehouses.....	1,139,733.27			1,142,984.35
Forage shed, Balboa.....		3,251.08		
Motor transportation.....	35,888.18			50,291.01
Addition to Building 5064, Cristobal.....		14,402.83		
Motor car repair shop.....	19,439.77			18,661.24
Building 556-X, extension, Balboa.....		665.47		
Building 5071, Cristobal, demolished.....			628.00	
Building 5073, Cristobal, demolished.....			516.00	
Building 5075, Cristobal, demolished.....			300.00	
Building repairs and construction.....	55,463.05			55,463.05
Panama Canal press.....	161,000.00			
Printing plant building, transfer.....			161,000.00	
Gold quarters.....	6,589,806.61			7,305,742.60
New quarters, Gamboa.....		235,385.30		
New quarters, Gatun.....		548,313.58		
Miscellaneous additions.....		10,097.11		
Transferred.....			5,800.00	
Demolished.....			72,060.00	



TABLE NO. 4.—*Business fixed property and equipment, fiscal year 1936—Contd.*

	Balance July 1, 1935	Additions	With- drawals	Balance June 30, 1936
Silver quarters.....	\$690,095.88			\$857,363.46
New quarters, Gamboa.....		\$167,417.58		
Miscellaneous additions.....		300.00		
Demolished.....			\$450.00	
Rented buildings.....	320,940.38			437,554.31
Garage stalls, Cristobal.....		6,051.68		
Police mess, reerected.....		862.72		
Building No. 320, Ancon, transfer.....		2,200.00		
Commissary warehouse, Ancon, transfer.....		23,000.00		
Combination store, Cristobal, transfer.....		103,000.00		
Demolished.....			18,500.47	
District quartermasters' supplies.....	18,964.46			36,616.05
Gasoline station, Balboa (adjustment).....		8,081.14		
Gasoline station, Pedro Miguel (adjustment).....		3,063.70		
Gasoline station, Gatun (adjustment).....		5,003.96		
Tank 116, Balboa, transfer.....		2,364.36		
Gasoline station, Cristobal (adjustment).....			861.57	
Total, business fixed property.....	26,457,907.34	1,914,216.97	723,609.43	27,648,514.88
BUSINESS EQUIPMENT				
Electric light and power system:				
Electric ranges.....	200,896.35	6,894.01		207,790.36
Electric heaters.....	17,833.59	171.77		18,005.36
Electric refrigerators.....	517.50			517.50
Electric work:				
Machinery and tools.....	34,843.14			42,069.54
Transfer.....		7,226.40		
Automobiles.....	3,779.54			3,779.54
Ditcher.....	1,675.00			1,675.00
Telephone, telegraph, and signal work: Machinery and tools.....	7,226.40			
Transferred.....			7,226.40	
Water system: Machinery and tools.....	22,325.18			22,325.18
Municipal engineering work:				
Machinery and tools.....	163,524.20	97,390.20		260,914.40
Road rollers.....	27,332.27	2,939.86	2,236.00	28,036.13
Shops and dry docks: Machinery and tools.....	1,495,850.58	31,880.98		1,527,731.56
Fuel oil plants: Machinery and tools.....	5,678.93			5,678.93
General stores: Equipment.....	940.00			940.00
Motor transportation:				
Machinery and tools.....	10,408.27			10,408.27
Automobiles.....	433,735.78	78,124.02	52,068.21	459,791.59
Mules.....	2,801.21			2,801.21
Motor car repair shop: Machinery and tools.....	21,818.83			21,818.83
Building repairs and construction: Machinery and tools.....	53,637.56			53,637.56
Panama Canal press: Machinery and tools.....	92,409.08			92,409.08
District quartermasters' supplies: Machinery and tools.....	7,893.25	6,114.68		14,007.93
Farm Bureau:				
Equipment.....	1,145.50			1,145.50
Mules.....	1,086.76			1,086.76
Launch <i>La Garza</i> .....	2,117.50			2,117.50
Total, business equipment.....	2,609,476.42	230,741.92	61,530.61	2,778,687.73
Total, business fixed property and equipment.....	29,067,383.76	2,144,958.89	785,140.04	30,427,202.61

TABLE NO. 5.—*Public works in cities of Panama and Colon, fiscal year 1936*

	Panama	Colon	Total
Status of capital cost to June 30, 1936:			
Construction cost:			
Water works and sewers.....	\$876,353.22	\$623,883.68	\$1,500,236.90
Pavements.....	592,913.23	625,619.03	1,218,532.26
Total construction cost.....	1,469,266.45	1,249,502.71	2,718,769.16
Amortization:			
Water works and sewers.....	480,962.60	342,242.22	823,204.82
Pavements.....	332,631.43	358,793.91	691,425.34
Total amortization.....	813,594.03	701,036.13	1,514,630.16

TABLE No. 5.—*Public works in cities of Panama and Colon, fiscal year 1936—Con.*

	Panama	Colon	Total
Capital cost reimbursable:			
Water works and sewers.....	\$395,390.62	\$281,641.46	\$677,032.08
Pavements.....	260,281.80	266,825.12	527,106.92
Capital value, June 30, 1936.....	655,672.42	548,466.58	1,204,139.00
Operating detail, fiscal year, 1936:			
Operation, maintenance, and repairs:			
Water works and sewers.....	79,020.40	39,744.20	118,764.60
Pavements.....	22,498.91	30,291.28	52,790.19
Proportion, Zone system.....	93,631.67	36,564.94	130,196.61
Street cleaning and garbage collection.....	79,192.21	36,535.20	115,727.41
Total.....	274,343.19	143,135.62	417,478.81
Interest at 2 percent per annum:			
Waterworks and sewers.....	8,050.75	5,734.59	13,785.34
Pavements.....	5,299.11	5,432.95	10,732.06
Proportion, Zone system.....	12,789.84	7,529.11	20,318.95
Total.....	26,139.70	18,696.65	44,836.35
Amortization:			
Waterworks and sewers.....	18,948.17	13,497.00	32,445.17
Pavements.....	12,471.89	12,786.48	25,258.37
Total.....	31,420.06	26,283.48	57,703.54
Total charged to water rentals.....	331,902.95	188,115.75	520,018.70
Water rental collections in the Republic of Panama.....	331,902.95	188,115.75	520,018.70

The Panama Canal supplies water to the cities of Panama and Colon from the Canal Zone water system, and maintains the sewers and streets in the two cities under a contract entered into between the Panama Canal and the Republic of Panama in 1907. The Panama Canal collects the water rentals from the residents of these two cities and uses the funds to cover the cost of the water and maintenance of sewers and streets, interest on the unamortized investment at 2 percent per annum, and amortization based on 50 years from 1907. The interest on the investment, amounting to \$1,522,498.45, and \$1,514,630.16 repaid on the capital cost, have been covered into the United States Treasury as miscellaneous receipts, United States revenues.

TABLE No. 6.—*Revenue due U. S. Treasury*

	Fiscal year 1935	Fiscal year 1936
Cash.....	\$202,467.62	\$231,287.56
Outstanding audited bills.....	100.00	100.00
Total.....	202,567.62	231,387.56

Collections for account of miscellaneous receipts form no part of the working capital of the Panama Canal, since these funds must by law be immediately covered into the United States Treasury and relinquished from control of the Panama Canal. These collections

consist mainly of tolls, licenses, court fees, and fines, and amortization of public works in Panama and Colon.

Owing to the above restrictions these items are segregated from cash and accounts pertaining to appropriated funds available for expenditure by Canal authorities.

TABLE NO. 7—*Treasury and fiscal officers' security-deposit accounts, fiscal year 1936*

	U. S. Treasury	Disbursing clerk, Washington, D. C.	Paymaster, Canal Zone	Collector, Canal Zone	Total
<b>Receipts:</b>					
Cash on hand July 1, 1935.....	\$5,250.56			\$436,845.95	\$442,096.51
Deposits.....		\$33,247.10	\$4,826,374.65	28,592,026.99	33,451,648.74
Total cash debits.....	5,250.56	33,247.10	4,826,374.65	29,028,872.94	33,893,745.25
<b>Disbursements:</b>					
Panama Canal bills.....				26,005,855.88	26,005,855.88
Individuals and companies.....		22,897.25		2,525,018.73	2,547,915.98
Refunds.....		2,771.84		38,229.84	41,001.68
Civil service retirement fund.....		7,562.51	373,947.06		381,509.57
Panama Railroad commissary and miscellaneous services.....			4,452,427.59		4,452,427.59
Cash on hand June 30, 1936.....	5,250.56	15.50		459,768.49	465,034.55
Total cash credits.....	5,250.56	33,247.10	4,826,374.65	29,028,872.94	33,893,745.25

Transactions by the disbursing clerk, Washington, D. C., consist principally of collections from employees for payment into the civil service retirement fund. There are also occasional deposits by individuals and companies guaranteeing the payment of Panama Canal and Panama Railroad Co. bills.

The paymaster's account consists entirely of collections from Panama Canal and Panama Railroad Co. employees for commissary coupon books, miscellaneous sales, and service rendered by the Panama Railroad Co. and the Panama Canal.

In the collector's account are deposited funds by banks, individuals, and companies to guarantee payment of bills rendered by the Panama Canal and the Panama Railroad Co., also deposits to guarantee fulfillment of contracts.

The disbursement shown under "Panama Canal bills" represents the revenue earned by the Panama Canal on bills charged against deposits, principally for tolls and other shipping activities. Payments to individuals and companies represent amounts paid the Panama Railroad Co. covering bills charged against depositors, and "refunds" covers amount refunded to various depositors of the difference between the amount deposited and the charges made against such deposits.

## INDEPENDENT TRUST FUNDS

TABLE NO. 8.—Receipts and disbursements of Canal Zone funds by collector

FISCAL YEAR 1935		FISCAL YEAR 1936	
Cash on hand beginning of year.....	\$2, 108, 059. 69	Cash on hand beginning of year.....	\$2, 345, 966. 21
Receipts:		Receipts:	
Clubhouse funds....	\$673, 246. 68	Clubhouse funds....	\$722, 064. 30
Trust funds.....	33, 936. 96	Trust funds.....	36, 549. 26
Money order funds..	2, 449, 016. 53	Money order funds..	2, 559, 848. 22
Interest.....	73, 173. 17	Interest.....	76, 112. 59
Reserve for fluctua- tion in bond values.....		Reserve for fluctua- tion in bond values.....	4, 800. 00
	<u>3, 229, 373. 34</u>		<u>3, 399, 374. 37</u>
Total.....	5, 337, 433. 03	Total.....	5, 745, 340. 58
Disbursements:		Disbursements:	
Clubhouse funds....	\$659, 559. 57	Clubhouse funds....	\$675, 152. 16
Trust funds.....	30, 122. 15	Trust funds.....	22, 992. 07
Money order funds..	2, 258, 688. 37	Money order funds..	2, 457, 786. 01
Interest.....	43, 096. 73	Interest.....	42, 511. 04
	<u>2, 991, 466. 82</u>		<u>3, 198, 441. 28</u>
Cash on hand end of year:		Cash on hand end of year:	
Clubhouse funds....	58, 457. 74	Clubhouse funds....	105, 369. 88
Trust funds.....	11, 518. 18	Trust funds.....	25, 075. 37
Money order funds..	2, 162, 191. 37	Money order funds..	2, 264, 253. 58
Interest.....	113, 617. 92	Interest.....	147, 219. 47
Postal savings.....	181. 00	Postal savings.....	181. 00
Reserve for fluctua- tion in bond values.....		Reserve for fluctua- tion in bond values.....	4, 800. 00
	<u>2, 345, 966. 21</u>		<u>2, 546, 899. 30</u>

TABLE No. 9.—Cash receipts and disbursements for account of the United States, fiscal year ended June 30, 1936

## CASH RECEIPTS

	Disbursing clerk, Washington, D. C.	Paymaster, Canal Zone	Collector, Canal Zone	Total fiscal officers	United States Treasurer	Total
On hand July 1, 1935, by appropriations and funds:						
Maintenance and operation, Panama Canal.....	\$427,657.15	\$1,310,191.71	\$108,740.31	\$1,846,599.17	\$6,051,548.00	\$7,898,147.17
Sanitation, Canal Zone, Panama Canal.....	3,738.18	124,679.95	5,857.34	134,275.47	2,207.28	136,482.75
Civil government, Panama Canal and Canal Zone.....	16,377.25	58,144.61	835.45	75,357.31	44,626.74	119,984.05
Postal funds, Canal Zone (special fund).....	-----	34,390.40	41,183.99	75,574.39	78,658.88	154,233.27
National industrial recovery, war, Panama Canal, 1933-35.....	950.00	17.91	-----	967.91	1,089.18	1,089.18
Repatriation of unemployed aliens, Panama Canal.....	-----	22,940.85	-----	22,940.85	100,000.00	122,940.85
Miscellaneous receipts, United States revenues.....	-----	202,467.62	202,467.62	202,467.62	202,467.62	404,935.24
Special deposits.....	-----	-----	436,845.95	436,845.95	5,250.56	442,096.51
Total.....	448,732.58	1,550,365.43	795,930.66	2,795,028.67	6,282,412.73	9,077,441.40
Appropriations for fiscal year 1936:						
Maintenance and operation, Panama Canal.....	-----	-----	-----	-----	6,900,000.00	6,900,000.00
Sanitation, Canal Zone, Panama Canal.....	-----	-----	-----	-----	874,010.00	874,010.00
Civil government, Panama Canal and Canal Zone.....	-----	-----	-----	-----	1,022,981.00	1,022,981.00
Total.....	-----	-----	-----	-----	8,797,997.00	8,797,997.00
Transfers between fiscal officers:						
Maintenance and operation, Panama Canal.....	4,800,000.00	11,195,536.47	-----	15,995,536.47	92,908.46	16,088,444.93
Sanitation, Canal Zone, Panama Canal.....	145,000.00	1,400,764.01	-----	1,545,764.01	58,697.76	1,604,461.77
Civil government, Panama Canal and Canal Zone.....	15,000.00	1,116,844.20	-----	1,131,844.20	7.00	1,131,851.20
Postal funds, Canal Zone (special fund).....	-----	185,000.00	-----	185,000.00	285,677.37	470,677.37
National industrial recovery war, Panama Canal, 1933-35.....	-----	-----	-----	-----	27.91	27.91
Total.....	4,960,000.00	13,898,144.68	-----	18,858,144.68	437,318.50	19,295,463.18
Collections:						
Maintenance and operation, Panama Canal.....	95,155.95	193,269.85	7,937,111.05	8,225,536.85	165.13	8,225,701.98
Sanitation, Canal Zone, Panama Canal.....	59,705.74	5.25	630,588.01	690,299.00	109.25	690,408.25
Civil government, Panama Canal and Canal Zone.....	16.00	-----	108,104.93	108,120.93	-----	108,120.93
Postal funds, Canal Zone (special fund).....	-----	-----	303,625.41	303,625.41	-----	303,625.41
National industrial recovery war, Panama Canal, 1933-35.....	10.00	-----	-----	10.00	-----	10.00
Repatriation of unemployed aliens, Panama Canal.....	-----	29.00	-----	29.00	-----	29.00
Miscellaneous receipts, United States revenues.....	2,371.22	25.74	23,702,247.40	23,704,644.36	-----	23,704,644.36
Special deposits.....	33,247.10	4,826,374.65	23,592,026.99	33,451,648.74	-----	33,451,648.74
Total.....	190,506.01	5,019,704.49	61,273,703.79	66,453,914.29	274.38	66,484,188.67
Total cash debts.....	5,599,238.59	20,468,214.60	62,069,634.45	88,137,087.64	15,517,002.61	103,654,090.25

TABLE NO. 9.—Cash receipts and disbursements for account of the United States, fiscal year ended June 30, 1936—Continued

## CASH DISBURSEMENTS

	Disbursing clerk, Wash- ington, D. C.	Paymaster, Canal Zone	Collector, Canal Zone	Total fiscal officers	United States Treasurer	Total
Covered into the United States Treasury, business profits, fiscal year 1935, maintenance and operation, Panama Canal.....					\$974, 355.34	\$974, 355.34
Tolls and other miscellaneous receipts, miscellaneous receipts, United States revenues.....	\$2, 371.22	\$25.74	\$23, 673, 427.46	\$23, 675, 824.42		23, 675, 824.42
Total.....	2, 371.22	25.74	23, 673, 427.46	23, 675, 824.42	974, 355.34	24, 650, 179.76
Transfers between fiscal officers:						
Maintenance and operation, Panama Canal.....	90, 975.66		7, 947, 469.27	8, 038, 444.93	8, 050, 000.00	16, 088, 444.93
Sanitation, Canal Zone, Panama Canal.....	58, 697.76		615, 764.01	674, 461.77	8, 930, 000.00	1, 694, 461.77
Civil government, Panama Canal and Canal Zone.....	7.00		106, 844.20	106, 851.20	1, 025, 000.00	1, 131, 851.20
Postal funds, Canal Zone (special fund).....			285, 677.37	285, 677.37	185, 000.00	470, 677.37
National Industrial recovery war, Panama Canal, 1933-35.....	10.00	17.91		27.91		27.91
Total.....	149, 690.42	17.91	8, 955, 754.85	9, 105, 463.18	10, 190, 000.00	19, 295, 463.18
Disbursements:						
Maintenance and operation, Panama Canal.....	4, 749, 655.49	11, 299, 117.22		16, 048, 772.71	585.86	16, 049, 358.57
Sanitation, Canal Zone, Panama Canal.....	141, 765.91	1, 435, 547.19		1, 577, 313.10		1, 577, 313.10
Civil government, Panama Canal and Canal Zone.....	31, 383.69	1, 075, 659.13		1, 107, 042.82		1, 107, 042.82
Postal funds, Canal Zone (special fund).....		196, 306.24		196, 306.24		196, 306.24
National Industrial recovery war, Panama Canal, 1933-35.....	950.00			950.00		950.00
Repatriation of unemployed aliens, Panama Canal.....	33, 231.60	8, 800.60		8, 800.60		8, 800.60
Special deposits.....		4, 826, 374.65	28, 569, 104.45	33, 428, 710.70		33, 428, 710.70
Total.....	4, 956, 986.69	18, 841, 805.03	28, 569, 104.45	52, 367, 896.17	585.86	52, 368, 482.03
On hand June 30, 1936:						
Maintenance and operation, Panama Canal.....	482, 191.95	1, 399, 880.81	98, 382.09	1, 980, 454.85	4, 019, 680.39	6, 000, 135.24
Sanitation, Canal Zone, Panama Canal.....	7, 980.25	89, 902.02	20, 681.34	118, 563.61	5, 630.29	124, 193.40
Civil government, Panama Canal and Canal Zone.....	2.56	99, 329.68	2, 096.18	101, 428.42	42, 614.74	144, 043.16
Postal funds, Canal Zone (special fund).....		23, 084.16	59, 132.03	82, 216.19	179, 336.25	261, 552.44
National Industrial recovery war, Panama Canal, 1933-35.....		14, 169.25		14, 169.25	149.18	14, 169.25
Repatriation of unemployed aliens, Panama Canal.....			231, 287.56	231, 287.56	100, 000.00	111, 169.25
Miscellaneous receipts, United States revenues.....	15.50		459, 768.49	459, 783.99	5, 250.56	231, 287.56
Special deposits.....						465, 031.55
Total.....	490, 190.26	1, 626, 365.92	871, 347.69	2, 987, 903.87	4, 352, 661.41	7, 340, 563.28
Total cash credits.....	5, 599, 238.59	20, 468, 214.60	62, 069, 634.45	88, 137, 087.64	15, 517, 002.61	103, 654, 690.25

During the current fiscal year the Treasurer of the United States advanced to the fiscal officers of the Panama Canal the sum of \$10,190,000 and disbursed directly from the Treasury \$585.86, a total of \$10,190,585.86. Against this amount the fiscal officers of the Panama Canal remitted to the Treasury the sum of \$437,318.50 and direct collections by the Treasurer amounted to \$274.38, a total of \$437,592.88, resulting in a net withdrawal of appropriated funds from the United States Treasury amounting to \$9,752,592.98 as compared with \$8,918,572.31 withdrawn the previous fiscal year.

Additional detail of collections by the collector on the Isthmus are shown in table no. 30, and of "Special deposit funds" in table no. 7.

TABLE No. 10.—*Accounts receivable*

## REGISTERED DURING THE YEAR

	Fiscal year 1935	Fiscal year 1936
Repaid to appropriations:		
Panama Railroad Co.....	\$1,949,491.43	\$2,142,884.11
Other departments of the U. S. Government.....	1,254,388.79	1,283,484.57
Individuals and companies.....	3,044,249.50	3,556,993.60
National industrial recovery.....	102,362.36	-----
Total.....	6,350,492.08	6,983,362.28
Miscellaneous receipts:		
Tolls.....	23,339,238.05	23,510,626.86
Public works, Panama.....	103,247.85	102,539.89
Total.....	23,442,485.90	23,613,166.75
Total accounts receivable registered.....	29,792,977.98	30,596,529.03
Number of bills registered.....	38,505	40,952

## OUTSTANDING ACCOUNTS RECEIVABLE

Audited bills.....	\$615,852.78	\$572,867.26
Hospital certificates.....	27,995.74	33,546.81
Injury compensation.....	4,380.48	5,523.63
Unredeemed commissary coupons.....	117.83	117.30
Total.....	648,346.83	612,055.00

The outstanding balance at the end of the fiscal year includes all accounts due the Panama Canal except items pertaining to miscellaneous receipts and a few items of utility service, principally for employees, which are not credited to earnings until collected, usually by pay-roll deductions.

TABLE No. 11.—*Material and supplies*

	Fiscal year 1935	Fiscal year 1936
Stock on hand, first of year:		
Balboa store.....	\$2, 027, 376. 53	\$2, 346, 452. 72
Medical store.....	72, 537. 33	59, 056. 21
Administration building store.....	20, 571. 92	20, 810. 09
Paraiso store.....	375, 608. 90	413, 646. 02
Cristobal store.....	391, 636. 67	589, 883. 84
Locks store.....	584, 799. 35	569, 218. 77
Fuel-oil plants.....	28, 967. 86	76, 013. 81
Panama Canal press.....	61, 317. 75	65, 973. 41
Sand and gravel pile.....	74, 710. 93	205, 074. 98
Division stores.....	192, 529. 59	229, 291. 62
Total stock card value.....	3, 830, 056. 83	4, 575, 421. 47
Reserve for inventory adjustments.....	341, 998. 14	346, 387. 68
Book value of stock on hand.....	3, 488, 060. 69	4, 229, 033. 79
Receipts of material:		
Purchases for stock.....	3, 799, 300. 86	4, 287, 492. 60
Purchases for divisions.....	770, 280. 03	697, 758. 84
Local production, service charges, etc.....	754, 160. 35	599, 848. 75
Book value of receipts.....	5, 323, 741. 24	5, 555, 100. 19
Total charges to stock.....	8, 811, 801. 93	9, 784, 133. 98
Issues and sales of material:		
Issues to business divisions.....	2, 197, 088. 93	3, 060, 923. 15
Issues to Canal divisions.....	1, 288, 994. 48	1, 263, 509. 39
Variation in division stores.....	<sup>1</sup> 36, 762. 03	41, 347. 17
Total issues.....	3, 449, 321. 38	4, 365, 779. 71
Sales.....	1, 133, 446. 76	1, 218, 200. 11
Total issues and sales.....	4, 582, 768. 14	5, 583, 979. 82
Stock on hand, end of year:		
Balboa store.....	2, 346, 452. 72	2, 419, 286. 89
Medical store.....	59, 056. 21	72, 395. 06
Administration building store.....	20, 810. 09	38, 761. 47
Paraiso store.....	413, 646. 02	403, 042. 68
Cristobal store.....	589, 883. 84	595, 761. 06
Locks store.....	569, 218. 77	595, 030. 55
Fuel-oil plants.....	76, 013. 81	72, 509. 77
Panama Canal press.....	65, 973. 41	66, 716. 97
Sand and gravel pile.....	205, 074. 98	155, 998. 23
Division stores.....	229, 291. 62	187, 944. 45
Total stock card value.....	4, 575, 421. 47	4, 607, 447. 13
Reserve for inventory adjustments.....	346, 387. 68	407, 292. 97
Book value of stock on hand.....	4, 229, 033. 79	4, 200, 154. 16

<sup>1</sup> Indicates reduction of issues and sales.

In the foregoing table all values are stated at stock-card prices which cover the cost of material delivered into general storehouses, except for necessary adjustments due to price averaging of various consignments of the same article, inventory discrepancies, exchange of containers, etc.

Issues to Canal divisions are made at cost, but issues to business divisions and sales to commercial interests are surcharged above the stock-card values shown in the foregoing table to produce the total revenue shown under "general storehouses" in table no. 26 against "gross expenses" which include storehouse operations as well as the cost of goods sold.



TABLE No. 12.—*Work in progress*

	Fiscal year 1935	Fiscal year 1936
Electrical division.....	\$3,437.19	\$924.54
Municipal division.....	3,688.78	445.44
Shops and drydocks.....	35,187.39	67,171.59
Building repairs and construction.....	2,259.49	18,535.64
Panama Canal press.....	1,850.93	4,022.16
Total.....	46,423.78	91,099.37

This account covers the amounts expended on uncompleted jobs, and will ultimately be cleared to operating expenses of the divisions indicated, with corresponding credits to their revenues after application of authorized surcharge.

TABLE No. 13.—*Deferred charges*

	Fiscal year 1935	Fiscal year 1936
Clubs and playgrounds.....	\$72.33	\$62.67
Health department.....	258.37	6,186.90
Port captain, Balboa.....	3,546.67	2,406.04
Lighthouse subdivision.....		382.53
Pacific locks.....		10,853.39
Atlantic locks.....		962.79
Dredging division.....	41,957.67	148,127.48
General accounts, suspense.....	14,475.10	
Electrical division.....	599.97	21,754.54
Municipal division.....		12,056.51
Shops and drydocks.....	29,693.62	30,118.10
Fuel oil plants.....		472.81
General storehouses.....	60.00	
Building repairs and construction.....	28,611.92	54,233.17
Gold quarters.....		9,000.00
District quartermasters' supplies.....	2,107.24	2,528.74
Public works:		
Panama.....	299.06	10,861.17
Colon.....	10,937.74	11,144.51
Total.....	132,619.69	321,151.35

This account covers expenses incurred for account of divisions indicated, but which are not chargeable to operating accounts of the current year. These amounts are cleared as soon as values are consumed.

TABLE No. 14.—*Capital investment*

Appropriations for Canal construction to June 30, 1921 (detail in Annual Report for 1924, table no. 3).....	\$386,910,301.00
Deduct value of capital stock of the Panama Railroad Co.....	7,000,000.00
Net construction appropriations.....	379,910,301.00
Annual payments to the Republic of Panama, 1913 to 1921 (State Department).....	2,250,000.00
Additional construction funds, 1922 to June 30, 1936.....	24,062,165.52
Total cash investment.....	406,222,466.52
Interest on construction funds (compounded annually) 1904 to 1921.....	143,652,360.43
Total capital investment.....	549,874,826.95

The capital investment account covers the following assets as of June 30, 1936, shown in comparison with assets on June 30, 1935.

	June 30, 1935	June 30, 1936
Canal fixed property (table no. 2).....	\$502, 170, 306. 85	\$503, 876, 479. 36
Canal equipment (table no. 3).....	10, 016, 956. 90	10, 247, 005. 98
Business fixed property and equipment (table no. 4).....	29, 067, 383. 76	30, 427, 202. 61
Public works, Republic of Panama (table no. 5).....	1, 261, 842. 54	1, 204, 139. 00
Proportion of working capital (table no. 23).....	4, 120, 000. 00	4, 120, 000. 00
Total capital assets.....	546, 636, 490. 05	549, 874, 826. 95

The construction period of the Panama Canal is considered as extending to the close of the fiscal year 1921, and computed interest during this period has been charged to capital account.

The capital investment at the close of the fiscal year 1936 amounted to \$549,874,826.95. The increase of about \$3,240,000 was due to the making of necessary additions to plant and equipment, the main items being expenditures for Madden Dam and power plant, pier no. 15, Balboa, the new dredging division station at Gamboa, quarters for gold employees, and numerous miscellaneous items. The value of items of plant and equipment which wore out or were sold during the year were deducted from the capital investment.

Interest on the capital investment from 1922 to date is considered as a charge to operating expenses, and while this charge does not appear on the balance sheet, a statement of such interest compared with net revenues, by years, is shown on table no. 21. Interest for the current fiscal year is based upon the capital investment of \$546,636,490.05, as of June 30, 1935, and amounts to \$16,399,094.70. Interest for the ensuing year will be based upon the capital investment of \$549,874,826.95 as of June 30, 1936.

TABLE NO. 15.—*Outstanding accounts payable*

	Fiscal year 1935	Fiscal year 1936
United States invoices.....	\$140, 116. 11	\$126, 646. 27 /
Isthmus vouchers.....	104, 408. 41	137, 901. 04
Current payrolls.....	991, 162. 50	1, 041, 364. 15
Unpaid salaries and wages.....	27, 031. 51	25, 204. 93
Drums, carboys, and reels.....	5, 871. 72	5, 320. 77
Local purchases.....	1 85. 98	1 2. 20
Total.....	1, 268, 504. 27	1, 336, 434. 96

1 Denotes debit.

The above table covers all current obligations of the Panama Canal, except deposits to guarantee payment of bills which are covered by table no. 7, security deposits, and table no. 8, trust funds.

TABLE No. 16.—*Reserve for replacements (funded)*

	Fiscal year 1935	Fiscal year 1936
Canal equipment:		
Tugs.....	\$468,607.29	\$362,710.09
Supply boats.....	20,499.21	46,570.59
Launches.....	148,188.48	146,876.48
Dredges.....	473,935.79	572,755.79
Lighters and scows.....	316,766.13	247,820.27
Craneboats.....	27,825.67	51,885.67
Barges.....	158,355.94	144,473.97
Ferryboats.....	38,709.49	50,709.49
Excavators.....	8,119.97	9,119.93
Cranes.....	6,500.65	7,569.25
Marine salvage equipment.....	5,432.57	5,487.57
Reserve equipment.....	106.82	106.82
Total Canal equipment.....	1,456,396.13	1,457,137.98
Business fixed property:		
Electric light and power system.....	353,477.31	401,362.89
Electric work.....	11,858.06	15,871.22
Water system.....	361,067.56	412,887.65
Municipal work.....		528.48
Shops and drydocks.....	75,642.17	100,574.27
Wharves and piers.....		30,000.00
Fuel-oil plants.....	559,493.35	711,061.12
General storehouses.....	71,441.12	92,190.04
Motor transportation.....	8,558.22	6,070.50
Motorcar repair shops.....	15,284.21	9,328.01
Building repairs and construction.....	12,455.81	14,095.37
Panama Canal press.....	17,216.00	
Gold quarters.....	191,201.45	37,881.24
Silver quarters.....	6,600.00	15,900.00
Rented buildings.....	87,260.46	118,322.68
District quartermasters' supplies.....	83.05	5,688.13
Hotel Tivoli.....	68,885.55	68,885.55
Colliers.....	72,145.46	72,145.46
Coal barges.....	50,000.00	50,000.00
Total business fixed property.....	1,962,669.78	2,162,792.61
Business equipment:		
Electric light and power system.....	13,170.06	10,962.36
Electric work.....	54,301.78	23,694.13
Telephone, telegraph and signal work.....	8,830.39	
Water system.....	25,486.59	
Municipal work.....	86,332.10	27,804.99
Shops and drydocks.....	135,387.76	179,310.74
Fuel-oil plants.....	6,161.62	4,412.87
General storehouses.....	40,647.02	46,110.18
Motor transportation.....	109,057.30	85,687.92
Motorcar repair shops.....	2,109.57	5,592.93
Building repairs and construction.....	38,619.25	36,804.35
Panama Canal press.....	40,879.06	40,676.90
District quartermasters' supplies.....	6,608.02	7,045.23
Hotel Tivoli.....	44,539.07	44,539.07
Farm bureau.....	2,461.27	2,636.79
Total business equipment.....	598,250.74	515,278.46
Total business fixed property and equipment.....	2,560,920.52	2,678,071.07
Total reserve for replacements.....	4,017,316.65	4,135,209.05
Less transfer to plant depreciation (unfunded).....	2,100,000.00	2,100,000.00
Total net reserve for replacements.....	1,917,316.65	2,035,209.05

<sup>1</sup> Denotes debit.

The foregoing table covers the amount of funds available for the replacement of fixed property and equipment. During the year there was added to the replacement reserve by charges to operating expenses, and from proceeds from sales, approximately \$1,184,250.

During the year the following charges, in round figures, were made against replacement reserves: Construction of tugs *Arraijan* (completion), \$89,900, and *Alhajuela* (completion), \$89,900; scow *No. 126*, \$130,000; launch *Hinds*, \$12,000; launch *Shark*, \$11,300; miscellaneous floating equipment, \$3,600; electric power-system replacements and improvements, \$82,500; municipal division, \$68,900; shop improvements, \$33,250; motorcar replacements, \$71,400; gold-quarters construction and improvements, \$301,700; and miscellaneous business property, machinery, and tools, \$171,900, a total expenditure of \$1,066,350.

This charge to replacement reserves of \$1,066,350 against accruals of \$1,184,250 results in a net increase in replacement reserves of \$117,900.

Against the combined reserves available for replacements and repairs at the close of the fiscal year 1936, amounting to \$2,906,500, as shown in the foregoing table and in table 17 following, approximately \$1,900,000 has already been allotted for expenditure in 1937.

TABLE NO. 17.—*Reserve for repairs (funded)*

	Fiscal year 1935	Fiscal year 1936
<b>Canal equipment:</b>		
Tugs.....	\$99,181.91	\$113,023.94
Supply boats.....	16,278.82	14,005.22
Launches.....	73,676.93	62,246.02
Dredges.....	52,185.35	40,993.81
Lighters and scows.....	186,669.56	162,049.82
Craneboats.....	3,918.90	8,318.58
Barges.....	68,559.41	94,841.84
Ferryboats.....	8,813.10	11,857.65
Total Canal equipment.....	487,028.34	489,326.44
<b>Business fixed property:</b>		
Electric light and power system.....	83,785.03	83,422.95
Electric work.....	1,252.61	2,657.78
Shops and drydocks.....	30,406.58	34,162.63
Wharves and piers.....	52,949.25	48,986.48
Fuel-oil plants.....	88,456.17	6,534.66
General storehouses.....	37,947.08	44,556.19
Building repairs and construction.....	300.00	604.36
Panama Canal press.....	3,634.44	2,247.31
Total business fixed property.....	298,731.16	223,172.36
<b>Business equipment:</b>		
Electric work.....	420.50	35,514.91
Municipal work.....	24,459.23	30,914.53
Shops and drydocks.....	74,963.83	71,792.61
Motor transportation.....	26,699.16	16,413.80
Building repairs and construction.....	1,385.26	253.98
Panama Canal press.....	1,342.76	1,032.09
Sand and gravel.....		1,289.42
Farm bureau.....	1,432.06	1,592.32
Total business equipment.....	130,702.80	158,803.66
Total business fixed property and equipment.....	429,433.96	381,976.02
Total reserve for repairs.....	916,462.30	871,302.46

<sup>1</sup> Denotes debit.

On July 1, 1935, the reserve for extraordinary repairs amounted to \$916,462.30, to which was added during the year \$843,226.86 by

charges to operating expenses. Expenditures of \$888,386.70 were charged against this reserve, leaving a balance on June 30, 1936, of \$871,302.46 available for general overhaul of floating equipment and extraordinary repairs to business property. (For obligations against the combined balance of replacement and repair reserves, see remarks under table no. 16.)

TABLE NO. 18.—*Reserve for vacation pay (funded)*

	Fiscal year 1935	Fiscal year 1936
Electrical division.....	\$126,644.45	\$129,069.29
Municipal division.....	65,454.44	61,756.74
Shops and drydocks.....	205,064.78	204,390.40
Motor transportation.....	19,591.86	19,405.13
Motor car repair shops.....	18,896.84	19,242.77
Building repairs and construction.....	21,445.84	30,668.37
Fortifications division.....	8,868.79	6,916.29
Total.....	465,967.00	471,448.99

The foregoing table represents the amount of cash held in reserve for vacation pay due employees of the principal business divisions. This fund is created by adding a percentage to direct labor charges for work performed by the division listed above to the credit of this account. The account is debited with the amount paid to employees when leave is actually taken.

TABLE NO. 19.—*Deferred credits*

	Fiscal year 1935	Fiscal year 1936
Executive offices.....	\$5,727.28	\$9,968.24
Accounting office.....	2,271.50	1,509.21
Civil government.....	9,920.30	30,773.52
Postal service.....	132,094.70	209,420.17
Health department.....	27,231.62	3,142.54
Office engineer.....	11,511.41	26,783.03
Surveys.....	3,322.49	4,399.08
District quartermaster, Balboa.....		4,129.65
District quartermaster, Pedro Miguel.....	105.93	97.25
District quartermaster, Gatún.....	149.78	297.62
District quartermaster, Cristobal.....	2,310.00	568.82
Port captain, Balboa.....	260,350.00	
Lighthouse subdivision.....	23,000.00	4,700.00
Pacific locks.....	1,653.44	782.62
Atlantic locks.....		1,323.80
Dredging division.....	10,000.00	15,069.36
General accounts, suspense.....	595.99	2,020.35
Electrical division.....	8,916.45	21,358.25
Municipal division.....	32,338.46	31,010.11
Shops and drydocks.....	68,655.49	55,764.51
General storehouses.....	2,099.24	2,914.42
Motor transportation.....	6,716.94	
Building repairs and construction.....	20,768.01	43,501.21
Panama Canal press.....		670.80
Gold quarters.....	12,233.00	
District quartermasters' supplies.....	294.04	80.44
Farm bureau.....	7,677.34	6,701.51
Nautical charts and publications.....	994.62	811.83
Contingencies, maintenance, and operation.....	45,472.93	45,436.23
Contingencies, sanitation.....	716.48	743.42
Contingencies, civil government.....	148.07	148.07
Total.....	697,275.51	524,126.06

This account covers expenses accrued or estimated which have been charged to operating accounts, but for which it was impracticable to institute corresponding payments at the close of the account-

ing period. These amounts are cleared as soon as corresponding charges are passed for payment, or contingent expenses arise.

TABLE No. 20.—Consolidated statement of income, expenses, and net revenues

	Fiscal year 1935	Fiscal year 1936
Canal operations:		
Canal revenues:		
Tolls.....	\$23,338,977.90	\$23,506,806.46
Postal surplus.....	7,264.32	24,617.20
Other miscellaneous receipts.....	74,693.36	95,298.01
Total Canal revenues (table no. 24).....	23,420,935.58	23,626,721.67
Canal earnings (table no. 25).....	3,116,756.27	3,278,210.71
Total revenues.....	26,537,691.85	26,904,932.38
Canal expenses:		
Executive department.....	412,477.77	463,856.69
Clubs and playgrounds.....	108,355.00	100,000.00
Accounting department.....	496,118.53	525,448.51
Washington office.....	253,100.70	262,902.22
Civil government.....	1,036,636.68	1,135,491.76
Postal service.....	263,820.18	285,908.21
Health department.....	1,495,872.91	1,608,164.54
Office engineer.....	113,495.96	217,524.93
Section of surveys.....	99,307.73	135,849.32
Public buildings and grounds.....	333,590.09	368,622.97
Marine division.....	1,453,849.80	1,488,933.26
Locks operation and maintenance.....	1,335,329.96	1,417,949.02
Locks overhaul.....	537,755.26	
Dams and spillway.....	43,534.26	88,985.67
Dredging division.....	2,076,586.54	2,366,356.85
Municipal expenses.....	307,790.06	307,641.38
Proportion of general stores expense.....	197,913.00	176,350.00
Railroad tracks maintenance.....	20,131.75	20,927.50
Recruiting and repatriating employees.....	47,960.33	21,403.02
Transportation of employees on Isthmus.....	120,000.00	111,071.54
Damage to vessels.....	1,210.56	8,265.17
Miscellaneous general expense.....	6,723.49	5,000.00
Depreciation on fixed property.....	1,006,625.28	1,006,625.28
Annual payment to republic of Panama.....	250,000.00	250,000.00
Total Canal expenses.....	12,018,185.84	12,373,277.84
Net Canal revenues (table no. 25).....	14,519,506.01	14,531,654.54
Fixed capital charge.....	15,538,640.64	15,566,827.91
Surplus (or deficit).....	<sup>1</sup> 1,019,134.63	<sup>1</sup> 1,035,173.37
Business operations:		
Business revenues.....	15,988,932.34	18,148,832.28
Business expenses.....	14,967,715.73	17,228,647.05
Net business revenues (table no. 26).....	1,021,216.61	920,185.23
Fixed capital charge.....	773,700.57	832,266.79
Surplus.....	247,516.04	87,918.44
Combined operations:		
Revenues.....	42,526,624.19	45,653,764.66
Expenses.....	26,985,901.57	29,601,924.89
Net revenues.....	15,540,722.62	15,451,839.77
Fixed capital charge at 3 percent.....	16,312,341.21	16,399,094.70
Surplus (or deficit).....	<sup>1</sup> 771,618.59	<sup>1</sup> 947,254.93
Capital investment (table no. 14).....	543,744,707.09	546,636,490.05
Combined net revenues.....	15,540,722.62	15,451,839.77
Percent of capital return.....	2.86	2.83

<sup>1</sup> Deficit.

A summary comparison of net revenues and capital interest, by years, from 1922 to date, is shown on table no. 21, following, together with a brief description of accounting policy governing charges to operating expenses.

TABLE No. 21.—*Revenues, expenses, and computed surplus*

Fiscal year	Tolls	Civil revenues	Business profits	Total revenues	Net appropriation expenses <sup>1</sup>	Net revenues	Capital interest (3 percent) <sup>2</sup>	Computed surplus
1914 to 1921	\$44,565,500.98	\$1,420,566.05	\$1,100,309.54	\$47,086,376.57	\$45,986,067.03	\$1,100,309.54		\$1,100,309.54
1922	11,193,383.47	192,208.85	323,259.16	11,708,851.48	8,169,017.63	3,539,833.85	\$15,759,105.50	3 12,219,271.65
1923	17,507,630.62	184,213.54	1,140,642.50	18,832,486.56	7,940,777.56	10,891,709.00	15,759,105.50	3 4,867,396.50
1924	24,289,603.16	392,250.73	901,624.12	25,583,478.01	8,623,905.39	16,959,572.62	15,759,105.50	1,200,467.12
1925	21,374,664.12	207,954.04	765,916.85	22,348,535.01	8,366,693.44	13,981,841.57	15,759,105.50	3 1,777,263.93
1926	22,927,456.03	217,680.50	841,310.29	23,986,446.82	8,243,468.47	15,742,978.35	15,796,305.50	3 53,327.15
1927	24,217,185.32	391,623.50	876,536.80	25,485,345.62	9,247,715.02	16,237,630.60	15,830,655.50	406,975.10
1928	26,943,513.11	232,532.57	736,719.43	27,912,765.11	9,201,200.82	18,711,564.29	15,845,453.84	2,866,110.45
1929	27,123,534.33	243,391.39	737,850.26	28,104,775.98	9,887,150.71	18,217,625.27	15,875,152.13	2,342,473.14
1930	349,255.35	349,255.35	760,971.66	28,187,344.37	9,593,620.93	18,593,723.44	15,900,652.13	2,692,771.31
1931	24,644,550.39	346,030.35	562,764.17	25,553,344.91	10,393,353.53	15,159,991.38	15,951,052.13	3 791,060.75
1932	20,706,568.49	327,444.23	557,095.44	21,591,108.16	9,839,211.84	11,751,896.32	15,914,378.57	3 4,162,482.25
1933	19,621,158.61	310,014.16	1,135,708.62	21,066,881.39	9,155,672.02	11,911,209.37	15,963,180.28	3 4,081,970.91
1934	24,065,065.16	96,666.67	1,366,755.12	25,528,486.95	7,551,383.77	18,177,103.18	16,176,001.78	2,001,101.40
1935	23,338,977.90	81,957.68	1,021,216.61	24,442,152.19	8,301,428.57	15,540,723.62	16,312,341.21	3 771,618.59
1936	23,506,806.46	119,915.21	920,185.23	24,546,906.90	9,095,067.13	15,451,839.77	16,399,094.70	3 947,254.93
Total	383,102,715.41	5,113,704.82	13,748,865.80	401,965,286.03	179,996,034.86	221,969,251.17	239,030,689.77	3 17,061,438.60

<sup>1</sup> After deduction of Canal earnings repaid to appropriations.<sup>2</sup> Interest prior to 1922 is included in capital investment account.<sup>3</sup> Debits.

The above table summarizes by classes the revenues received by the Panama Canal by fiscal years from 1921 and shows the net results from operations after deducting therefrom the net current expenses chargeable to appropriations and the current interest charge on the capital investment. The interest rate of 3 percent has been used in making computations a great many years. The use of this rate received the approval of two organizations which investigated Panama Canal matters and was formally adopted when the present accounting system was established in 1932. It has been considered a fair and reasonable rate, as the Government at various times has paid much higher rates for the use of money.

Interest chargeable to operations is not included on the balance sheet and no interest charge against the Canal is actually made by the United States Treasury.

The close of the fiscal year 1921 was fixed as the date for transferring the interest burden from capital to operating accounts, upon the recommendation of the United States Bureau of Efficiency, made at the time the present accounting system was adopted.

Total revenues on the foregoing statement represent receipts which must be covered into the United States Treasury and relinquished from control of the Panama Canal. Earnings repayable to Canal appropriations, and reexpendable by the Canal, are deducted from gross operating expenditures, in order to present a comparison of funds covered into the Treasury with funds chargeable to operating account, exclusive of capital additions.

Operating expenses include depreciation charges based upon the estimated life of plants and equipment of the value of about \$38,000,000 and also a depreciation charge of approximately \$1,000,000 per year on depreciable items of general property of a value of nearly \$57,000,000. While this latter amount is small in comparison with capital values, the greater portion of Canal construction costs cover waterways and harbors which are in the nature of geographical changes and which do not depreciate; in fact, constant dredging operations, the cost of which is charged to current expenses, are gradually deepening, straightening, and widening Canal channels and basins. The value of this property, for which no depreciation charges are made, amounts to about \$455,000,000. It would seem that, if the indebtedness of the United States on account of the Panama Canal is to be liquidated within a fixed period of time, the depreciation charges should be so fixed, as they are now, as to take care of that part of the investment which is subject to depreciation, and that the amortization charge should have a direct relation to this balance of the investment (\$455,000,000).

The absence of tax charges is compensated for by the inclusion in Canal operating accounts of the direct costs of civil government,



health, and welfare activities. Neither capital nor operating expenses of the Panama Canal include the cost of the military and naval establishments on the Isthmus; however, all important exchanges of services with these interests are covered by cash settlements, or reciprocal allowances.

By including in the accounts all revenues properly applicable to Canal activities and by charging against the total revenues the net appropriation expenses including charges for depreciation as hereinbefore outlined and interest at 3 percent on the capital invested but excluding any charge to amortize the investment, there has accumulated as of June 30, 1936, as shown by the above table, a deficit in excess of \$17,000,000. Before the Canal can be considered upon a paying basis and before any provision can be made to amortize the investment in the Canal, this deficit must be liquidated.

TABLE NO. 22.—*Capital refundments*

## MISCELLANEOUS RECEIPTS COVERED INTO THE U. S. TREASURY

Fiscal year	Tolls	Postal receipts	Taxes, fees, fines, etc.	Business profits	Miscellaneous <sup>1</sup>	Total
1922.....	\$11,205,886.64	\$117,047.24	\$45,201.62	\$621,272.19	\$60,000.00	\$12,049,407.69
1923.....	17,228,097.42	117,173.59	45,846.19	323,259.16	153,898.37	17,868,274.73
1924.....	24,486,652.08	119,364.27	57,049.31	1,140,642.50	270,807.97	26,074,516.13
1925.....	21,399,629.39	136,032.67	56,506.22	901,624.12	55,286.36	22,549,078.76
1926.....	22,920,422.67	142,854.91	63,433.56	765,916.85	49,177.00	23,941,804.99
1927.....	24,239,775.87	144,542.94	67,601.53	841,310.29	251,473.37	25,544,704.00
1928.....	26,955,647.14	147,502.27	73,118.06	876,536.80	81,541.51	28,134,345.78
1929.....	27,054,536.55	162,590.89	72,651.38	736,719.43	104,948.94	28,131,447.19
1930.....	27,121,831.94	261,183.41	76,986.81	737,850.26	75,227.77	28,273,080.19
1931.....	24,670,281.59	257,061.52	80,053.25	760,971.66	64,300.78	25,832,668.80
1932.....	20,776,860.08	241,447.36	75,319.54	562,764.17	92,520.30	21,748,911.45
1933.....	19,464,173.04	236,572.53	71,207.83	557,095.44	890,289.84	21,219,338.68
1934.....	24,135,261.01	20,124.04	71,092.79	611,423.74	2,035,500.15	26,873,401.73
1935.....	23,297,587.74	-----	71,844.72	722,520.51	175,904.58	24,267,857.55
1936.....	23,482,083.87	-----	88,803.70	974,355.34	104,936.85	24,650,179.76
Total.....	338,438,727.03	2,103,497.64	1,016,716.51	11,134,262.46	4,465,813.79	357,159,017.43

## TOTAL APPROPRIATIONS

Fiscal year	Maintenance and operation	Sanitation	Civil government	Miscellaneous appropriation <sup>2</sup>	Annual payment to Panama	Total
1922.....	\$7,250,000	\$850,000	\$900,000	\$21,500	\$250,000	\$9,271,500.00
1923.....	2,659,434	525,000	930,000	16,800	250,000	4,381,234.00
1924.....	5,079,683	575,000	930,000	17,520	250,000	6,852,203.00
1925.....	5,851,210	586,266	991,670	-----	250,000	7,679,146.00
1926.....	7,140,000	653,216	942,150	-----	250,000	8,985,366.00
1927.....	5,986,094	670,000	999,980	-----	250,000	7,906,074.00
1928.....	5,830,000	670,000	1,100,000	-----	250,000	7,850,000.00
1929.....	6,832,000	722,000	1,172,400	-----	250,000	8,976,400.00
1930.....	8,000,000	820,000	1,201,000	-----	250,000	10,271,000.00
1931.....	10,162,470	753,900	1,295,190	-----	250,000	12,461,560.00
1932.....	9,359,508	782,189	1,351,689	-----	250,000	11,743,686.00
1933.....	11,891,011	755,650	1,300,000	-----	250,000	14,196,661.00
1934.....	11,172,700	698,426	1,235,278	1,150,000	250,000	14,506,404.00
1935.....	4,971,490	768,501	792,935	-----	250,000	6,782,926.00
1936.....	6,900,000	874,616	1,022,981	-----	250,000	9,047,597.00
Total.....	109,085,900	10,704,764	16,165,273	1,205,820	3,750,000	140,911,757.00
Less expenditure for capital construction (table no. 14).....	-----	-----	-----	-----	-----	24,062,165.52
Net appropriations for Canal maintenance and operation.....	-----	-----	-----	-----	-----	116,849,591.48
Total miscellaneous receipts covered into U. S. Treasury.....	-----	-----	-----	-----	-----	357,159,017.43
Net appropriations for Canal maintenance and operation.....	-----	-----	-----	-----	-----	116,849,591.48
Net capital refundments from Canal operation.....	-----	-----	-----	-----	-----	240,309,425.95

<sup>1</sup> Includes amortization on public works, Panama and Colon, bank interest, sale of Government property, etc., also economy act impoundings amounting to \$835,626.77 for 1933, \$1,723,360.47 for 1934, and \$70,570.19 for 1935.

<sup>2</sup> Miscellaneous appropriations for 1922, 1923, and 1924 were for increase of compensation: fiscal year 1934 covers National Recovery Act, \$1,000,000, and repatriation of unemployed aliens, \$150,000.

The balance in capital refundment account measures the difference between Canal revenues covered into the United States Treasury as miscellaneous receipts, United States revenues, from July 1, 1921, and the net amounts appropriated for maintenance and operation of the Canal. The appropriations for maintenance and operation include provision for certain items of capital improvements, and in 1934 a separate appropriation for \$1,000,000 under the National Recovery Act also covers capital improvements. Actual cost of such improvements has been deducted from total appropriations and included in capital investment account (table no. 14).

Although the above table shows a net cash refundment of \$240,-309,425.95, such refundment is not deductible from capital investment, which is considered as measuring the value of the Panama Canal as an instrument of public utility upon which a perpetual interest return should be earned; furthermore, interest on the capital investment chargeable to operating account is not included in cash transactions with the United States Treasury. Capital interest at 3 percent from 1922 to 1936, chargeable to operating account, would have amounted to \$239,030,689.77, as set forth in table no. 21.

Miscellaneous receipts deposited in the United States Treasury prior to 1922 have been applied to equalize appropriations for operation and working capital.

TABLE NO. 23.—*Balance of revenues and refundments*

DEBITS	
Revenue due U. S. Treasury.....	\$231, 387. 56
Appropriated cash in U. S. Treasury (table no. 9).....	4, 347, 410. 85
Appropriated cash with fiscal officers (table no. 9).....	2, 296, 832. 32
Accounts receivable (table no. 10).....	612, 055. 00
Stores (table no. 11).....	4, 200, 154. 16
Work in progress.....	91, 099. 37
Deferred charges.....	321, 151. 35
<b>Total debits.....</b>	<b>12, 100, 090. 61</b>
CREDITS	
Accounts payable (table no. 15).....	1, 336, 434. 96
Reserve for replacements (table no. 16).....	2, 035, 209. 05
Reserve for repairs (table no. 17).....	871, 302. 46
Reserve for vacation pay (table no. 18).....	471, 448. 99
Deferred credits.....	524, 126. 06
<b>Total credits.....</b>	<b>5, 238, 521. 52</b>
Net current accounts.....	6, 861, 569. 09
Less proportion under capital investment (table no. 14).....	4, 120, 000. 00
<b>Balance.....</b>	<b>2, 741, 569. 09</b>

A revolving fund now fixed at \$4,120,000 is set up in Canal accounting for working capital and is credited to capital investment account in addition to funds used for construction and equipment, the total constituting the base for capital interest computations. Net

working capital in excess of the revolving fund is considered as a temporary advance of Treasury funds, but is usually less than appropriated funds not withdrawn from the Treasury. Working capital investments are in constant process of accrual and liquidation for account of the United States Treasury.

TABLE No. 24.—*Canal revenues*

	Fiscal year 1935	Fiscal year 1936
Tolls.....	\$23,338,977.90	\$23,506,806.46
Postal surplus.....	7,264.32	24,617.20
Licenses, fees, fines, etc.....	72,587.40	92,879.20
Interest.....	4.49	-----
Miscellaneous.....	2,101.47	2,418.81
Total.....	23,420,935.58	23,626,721.67

Canal revenues shown above comprise earnings which by law must be covered into the United States Treasury as miscellaneous receipts, United States revenues, and relinquished from control of the Panama Canal, as distinguished from earnings repayable to Canal appropriations shown on tables 25 and 26.

Owing to a change in the law made effective at the beginning of the fiscal year 1934 the appropriation for postal expenses was discontinued, and postal receipts have been applied to defray such expenses, instead of being covered directly into the United States Treasury, as formerly, and only the surplus of postal receipts over postal expenses is for account of United States revenues.

TABLE No. 25.—*Canal earnings, expenses, and net revenues*

	Expenses	Earnings	Net expenses
Executive department:			
Executive offices.....	\$463,856.69	\$156,250.96	\$307,605.73
Clubs and playgrounds.....	100,000.00	-----	100,000.00
Total.....	563,856.69	156,250.96	407,605.73
Accounting department:			
Accounting office.....	432,457.06	275,974.33	156,482.73
Paymaster's office.....	44,649.42	26,686.67	17,962.75
Collector's office.....	48,342.03	33,566.50	14,775.53
Total.....	525,448.51	336,227.50	189,221.01
Washington office.....	262,902.22	47,159.83	215,742.39
Civil government:			
Civil affairs.....	16,760.09	-----	16,760.09
Customs.....	28,364.72	281.00	28,083.72
Postal service.....	285,908.21	285,908.21	-----
Division of schools.....	472,836.89	42,239.13	430,597.76
Fire protection.....	130,095.16	83.43	130,011.73
Police section.....	461,872.23	67,365.20	394,507.03
Magistrates' courts.....	18,460.09	-----	18,460.09
District court.....	7,102.58	-----	7,102.58
Total.....	1,421,399.97	395,876.97	1,025,523.00

TABLE No. 25.—*Canal earnings, expenses, and net revenues.*—Continued

	Expenses	Earnings	Net expenses
<b>Health department:</b>			
Chief health office.....	\$37,587.03		\$37,587.03
Gorgas Hospital.....	710,280.35	\$359,407.40	350,872.95
Colon Hospital.....	166,027.75	91,041.52	74,986.23
Corozal Hospital.....	104,625.75	23,812.13	80,813.62
Palo Seco colony.....	40,844.37	25,870.00	14,974.37
Line dispensaries.....	93,581.88	28,775.41	64,806.47
Medical store.....	7,091.39		7,091.39
Quarantine service.....	75,817.95	21,278.48	54,539.47
Sanitation, Panama.....	38,254.31	8,544.92	29,709.39
Sanitation, Colon.....	21,831.37	3,026.12	18,805.25
Sanitation, Zone.....	157,919.22	54,867.15	103,052.07
Street cleaning and garbage collection, Panama.....	105,589.59	79,192.21	26,397.38
Street cleaning and garbage collection, Colon.....	48,713.58	36,535.20	12,178.38
Total.....	1,608,164.54	732,350.54	875,814.00
<b>Technical divisions:</b>			
Office engineer.....	217,524.93	159,808.61	57,716.32
Surveys.....	135,849.32	68,739.37	67,109.95
Total.....	353,374.25	228,547.98	124,826.27
<b>Public buildings and grounds:</b>			
Chief quartermaster's office.....	40,820.07	34,559.17	6,260.90
District quartermaster, Balboa.....	178,657.44	47,651.94	131,005.50
District quartermaster, Pedro Miguel.....	40,264.20	29,875.05	10,389.15
District quartermaster, Gatun.....	30,285.94	16,954.41	13,331.53
District quartermaster, Cristobal.....	78,595.32	25,310.26	53,285.06
Total.....	368,622.97	154,350.83	214,272.14
<b>Marine division:</b>			
Marine superintendent.....	21,099.83	1,724.45	19,375.38
Port captain, Balboa:			
General.....	118,476.24	5,371.24	113,105.00
Admeasurement of vessels.....	24,190.62	450.00	23,740.62
Pilotage.....	161,367.78	82,729.00	78,638.78
Handling lines.....	123,777.72	126,032.00	<sup>1</sup> 2,254.28
Tugs.....	110,275.15	65,962.25	44,312.90
Launches.....	78,846.25	72,587.00	6,259.25
Port captain, Cristobal:			
General.....	60,012.69	1,310.68	58,702.01
Admeasurement of vessels.....	26,015.33	720.00	25,295.33
Pilotage.....	190,907.54	208,073.00	<sup>1</sup> 17,165.46
Handling lines.....	126,531.58	132,132.00	<sup>1</sup> 5,600.42
Tugs.....	122,632.30	107,643.25	14,989.05
Launches.....	59,717.44	62,090.00	<sup>1</sup> 2,372.56
Aids to navigation.....	265,082.79	52,302.39	212,780.40
Total.....	1,488,933.26	919,127.26	569,806.00
<b>Locks operation and maintenance:</b>			
Pacific locks:			
Miraflores locks.....	510,936.93		510,936.93
Pedro Miguel locks.....	368,798.07		368,798.07
Total Pacific locks.....	879,729.00		879,729.00
Atlantic locks:			
Gatun locks.....	538,220.02		538,220.02
Total.....	1,417,949.02		1,417,949.02
<b>Dams and spillways:</b>			
Gatun Dam.....	38,136.98		38,136.98
Gatun spillway.....	3,353.53		3,353.53
Madden Dam.....	47,495.16		47,495.16
Total.....	88,985.67		88,985.67
<b>Dredging division:</b>			
Atlantic entrance.....	2,272.49		2,272.49
Gatun Lake.....	576,951.34		576,951.34
Gaillard Cut.....	1,051,647.55		1,051,647.55
Miraflores Lake.....	104,736.98		104,736.98
Pacific entrance.....	113,258.59		113,258.59
Cristobal Harbor.....	47,399.69		47,399.69
Balboa Harbor.....	25,658.00		25,658.00
Removal of floating obstructions.....	71,132.22		71,132.22
Maintenance of floating cranes.....	40,196.93		40,196.93
Dredging division work.....	333,073.06	308,318.84	24,754.22
Total.....	2,366,356.85	308,318.84	2,058,038.01

<sup>1</sup> Denotes credit balance.

TABLE NO. 25.—*Canal earnings, expenses, and net revenues.*—Continued

	Expenses	Earnings	Net expenses
Municipal expenses:			
Street lighting.....	\$22,359.02		\$22,359.02
Water for municipal purposes.....	23,400.00		23,400.00
Roads, streets, and sidewalks.....	158,020.63		158,020.63
Storm sewers.....	10,568.28		10,568.28
Thatcher Ferry.....	93,293.45		93,293.45
Total.....	307,641.38		307,641.38
Miscellaneous general expenses:			
Proportion of general stores expense.....	176,350.00		176,350.00
Railroad tracks maintenance.....	20,927.50		20,927.50
Recruiting and repatriating employees.....	13,077.65		13,077.65
Repatriating alien ex-employees.....	8,325.37		8,325.37
Transportation on the Isthmus.....	111,071.54		111,071.54
Damage to vessels.....	8,265.17		8,265.17
Canal Zone experimental gardens.....	5,000.00		5,000.00
Depreciation on fixed property.....	1,006,625.28		1,006,625.28
Annual payment to the Republic of Panama.....	250,000.00		250,000.00
Net Canal expenses.....	12,373,277.84	\$3,278,210.71	9,095,067.13

## SUMMARY

Canal revenues (table no. 24).....	\$23,626,721.67
Net Canal expenses.....	9,095,067.13
Net Canal revenues.....	14,531,654.54

The earnings of the divisions engaged in the transiting of vessels through the Canal, as well as earnings of sanitation and civil-government divisions, are deducted from gross expenses to arrive at the net expenditure from Canal appropriations, which in turn is deducted from Canal revenues to arrive at net Canal revenues, exclusive of business-division profits.

Earnings of the executive offices and accounting department represent principally a proportional charge against business divisions of the Panama Canal and the Panama Railroad Co. Business divisions are reimbursed for this proportional expense by adding a surcharge to the direct cost on all work performed. The Panama Railroad's proportion is distributed to the various units of that organization.

The Government's contribution to the operation and maintenance of clubs and playgrounds was \$100,000 in 1936. All expense in excess of this amount is paid from receipts and profits from the operation of the clubhouses.

The earnings of the Washington office include \$46,600 charged against business storehouse operations to cover a proportional part of the cost of purchasing, inspection, and handling of material used by business divisions or sold to outside interests, which expense is covered through surcharges added to the price of material.

TABLE NO. 26.—*Business expenses, revenues, and profit and loss*

Division	Expenses	Revenues	Profit or loss
Electric light and power system.....	\$533, 222. 43	\$827, 105. 75	\$293, 883. 32
Electric work.....	736, 711. 60	756, 680. 47	19, 968. 87
Telephone, telegraph, and signal work.....	150, 578. 80	150, 819. 32	240. 52
Water system.....	453, 152. 90	520, 452. 01	67, 299. 11
Municipal work.....	1, 629, 834. 10	1, 647, 111. 55	17, 277. 45
Shops and drydocks.....	3, 076, 180. 56	3, 132, 055. 18	55, 874. 62
Wharves and piers.....	47, 230. 20	62, 924. 63	15, 694. 43
Fuel-oil plants.....	649, 221. 38	828, 908. 10	179, 686. 72
General storehouses.....	5, 418, 256. 51	5, 503, 195. 71	84, 939. 20
Motor transportation.....	396, 050. 71	443, 516. 11	47, 465. 40
Motorcar repair shops.....	179, 669. 82	185, 666. 22	5, 996. 40
Building repairs and construction.....	2, 063, 314. 58	2, 087, 227. 33	23, 912. 75
Panama Canal press.....	189, 690. 02	206, 918. 65	17, 228. 63
Gold quarters.....	532, 687. 12	532, 793. 62	106. 50
Silver quarters.....	288, 231. 38	288, 423. 27	191. 89
Rented buildings.....	32, 429. 76	65, 412. 51	32, 982. 75
District quartermasters' supplies.....	260, 367. 56	264, 957. 08	4, 589. 52
Farm bureau.....	19, 858. 15	19, 988. 59	130. 44
Nautical charts and publications.....	1, 653. 22	2, 788. 80	1, 135. 58
Sand and gravel operations.....	71, 693. 72	78, 438. 50	6, 744. 78
Fortifications division.....	23, 430. 18	23, 430. 18	-----
Public works, Panama.....	305, 763. 25	331, 902. 95	26, 139. 70
Public works, Colon.....	169, 419. 10	188, 115. 75	18, 696. 65
Total.....	17, 228, 647. 05	18, 148, 832. 28	920, 185. 23

The profit on business operations as above, amounting to \$920,185.23, compares with profits in 1935 of \$1,021,216.61. However, salary reductions due to economy acts amounted to \$144,851.74 in 1935, whereas the acts were not effective in 1936. Eliminating the Economy Act savings would show a normal profit of \$876,364.87 in 1935.

Profits on public works, Panama and Colon, amounting to \$44,836.35, represent interest which has been currently reported for coverage into general funds of the United States Treasury. The balance of the total profits, amounting to \$875,348.88, will be immediately covered into the Treasury as miscellaneous receipts, United States revenues, in accordance with regulations.

Business operations of the Panama Canal are conducted separately from operating activities pertaining directly to the transiting of vessels and government of the Canal Zone. The annual appropriation acts for the Panama Canal authorize the use of appropriated funds for the conduct of auxiliary business activities, provided that funds so advanced are recovered through earnings, and with the further proviso that any net profit derived from such business activities be covered annually into the United States Treasury.

TABLE No. 27.—Balances in appropriation and fund accounting ledger, June 30, 1936

Assets		U. S. Treasury appropriations	Cash on hand	Accounts receivable	Transfers available	Work in progress and suspense	Storehouse stock	Total
Maintenance and operation, Panama Canal.....		\$4,019,680.39	\$1,980,454.85	\$514,788.77	\$108,387.07	\$126,165.48	\$4,107,834.83	\$10,857,311.39
Sanitation, Canal Zone, Panama Canal.....		5,630.29	118,563.61	87,393.94	-----	2,300.94	76,134.81	290,043.59
Civil government, Panama Canal and Canal Zone.....		42,614.74	101,428.42	7,447.29	-----	-----	16,184.52	167,634.97
National Industrial Recovery war, Panama Canal, 1933-35.....		149.18	-----	-----	-----	-----	-----	149.18
Postal funds, Canal Zone (special fund).....		179,336.25	82,216.19	2,425.00	-----	-----	-----	263,977.44
Repatriation of unemployed aliens, Panama Canal.....		100,000.00	14,169.25	100.00	-----	-----	-----	114,169.25
Miscellaneous receipts, United States revenues.....		-----	231,287.56	-----	875,348.88	-----	-----	1,106,736.44
Total.....		4,347,410.85	2,528,119.88	612,155.00	983,735.95	128,466.42	4,200,154.16	12,800,042.26

  

Liabilities		Working capital allotment	Reserve for impounded balances	Accounts payable	Transfers payable	Special liabilities	General ledger reserves	Balance	Total
Maintenance and operation, Panama Canal.....		\$4,010,000.00	\$24,779.23	\$1,125,792.59	\$875,348.88	-----	\$3,377,960.50	\$1,443,430.19	\$10,857,311.39
Sanitation, Canal Zone, Panama Canal.....		100,000.00	11,760.43	118,659.16	65,951.86	-----	-----	7,193.00	290,043.59
Civil government, Panama Canal and Canal Zone.....		10,000.00	14,143.95	77,446.21	37,343.08	\$30,921.59	-----	16,088.04	167,634.97
National Industrial Recovery war, Panama Canal, 1933-35.....		-----	-----	-----	-----	-----	-----	149.18	149.18
Postal funds, Canal Zone (special fund).....		-----	2,524.67	14,394.00	5,065.56	209,420.17	-----	32,573.04	263,977.44
Repatriation of unemployed aliens, Panama Canal.....		-----	-----	143.00	26.57	-----	-----	113,999.03	114,169.25
Miscellaneous receipts, United States revenues.....		-----	-----	1,106,736.44	-----	-----	-----	-----	1,106,736.44
Total.....		4,120,000.00	21,399.52	2,443,171.40	983,735.95	240,341.76	3,377,960.50	1,613,433.13	12,800,042.26

1 Denotes debit.

This table shows the status of Panama Canal working capital by the various appropriations and funds by which it is separately accountable under existing laws and Treasury regulations.

A revolving fund of \$4,120,000 is set aside in Canal accounting to cover the net investment in current accounts, which sum is included in the capital investment account (table no. 14).

Of the \$1,613,433.13 shown as available in the above balance column, \$191,589 will be used to reduce appropriation requirements in 1938 and \$101,135 has been set aside as savings; the balance of \$149.18 remaining in the national industrial recovery fund will be returned to the Treasury; the \$32,573.04 representing postal surplus is for account of United States revenues; and \$77,999.68 of the balance in the fund for repatriation of unemployed aliens has been reserved for subsequent allotment; making total deductions of \$403,445.90, thus leaving an adjusted balance of \$1,209,987.23 to supplement appropriations for allotment, as below:

	Adjusted balance 1936	Appro- priation 1937	Allotment 1937
Maintenance and operation, Panama Canal.....	\$1, 160, 543	\$9, 149, 201	\$10, 309, 744
Sanitation, Canal Zone, Panama Canal.....	7, 193	899, 793	906, 986
Civil government, Panama Canal and Canal Zone.....	6, 251	1, 073, 950	1, 080, 201
Repatriation of unemployed aliens, Panama Canal.....	36, 000	-----	36, 000
Total.....	1, 209, 987	11, 122, 944	12, 332, 931



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